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WELCOME TO THE
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THE JOURNAL OF OPHTHALMOLOGY, OTOLOGY AND LARYNGOLOGY.

EDITOR,
CHARLES DEADY, M. D.

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A CLINICAL EXPERIENCE WITH PYOKTANIN AS AN AUXILIARY IN THE TREATMENT OF EYE DISEASES.

BY SAYER HASBROUCK, M. D., PROVIDENCE, R. I.

The publication of Prof. Stilling's paper on Pyoktanin, in the June number of *Merck's Bulletin* for 1890, attracted my attention, from the fact that ophthalmology appeared to be its clinical field. The subsequent reports proved amusing, as some were almost enthusiastic, while others claimed purely negative results.

This was not surprising, as Prof. Stilling's first article read very much like an outbreak of pent-up enthusiasm, and for the moment one felt as though the panacea had been found and needed only to be applied, to cure all diseases the eye might be heir to. It proclaimed with the blackest of headlines that Pyoktanin had so far absolutely *cured*

Pyoid corneal ulcers,	} in one day,
Hypopion keratitis,	
Marginal eye ulcers,	
Parenchymatous keratitis,	} in a week or two,
Serous iritis,	

the full list being a most wonderful statement of the results following its clinical use.

Wonderful as this report seemed, Prof. Stilling's subsequent reports appeared to sustain his first claims, and though some experimenters reported negative results,

many others corroborated almost all his statements, and for a time this state of affairs caused a confusion of opinion.

Still I felt willing to sympathize with Prof. Stilling when he said that the negative results must have been due to a misunderstanding of the methods of its application. I have referred thus briefly to the literature of the drug, as it illustrates the doubtful feeling I had of its reported virtues.

It is not my habit to experiment with new remedies, still I became interested in the reports of this one; but before deciding to make a trial, I said to myself, The Germ Theory of disease seems to be the guiding star of the present medical thought, and the inference is that our therapeutic agents are to be sought for among the so-called germicides. The laboratory tests of Pyoktanin, without a doubt, have proved it worthy of a therapeutic test, and its almost non-irritating nature ought to merit a persistent trial of its therapeutic action, especially as our present antiseptic remedies are so frequently abandoned on account of their irritating qualities, thus depriving us of a therapeutic principle, which daily seems to be proving itself indispensable in the treatment of disease.

Feeling that Pyoktanin merited a trial, I procured a supply of the blue and the yellow, in the various forms, as recommended by Prof. Stilling.

Although my experiments have been almost wholly with the yellow, still I have used both, alone and in alternation; finding the yellow satisfactory it has become somewhat of a routine with me. I am aware that Prof. Stilling considers the blue more potent, and advises its application in the severer cases, and at present I should follow his advice. It is probably hardly necessary to apologize for my methods, as the title of my paper in a way explains itself; but as I do not wish to be misunderstood, I will say that I have used Pyoktanin simply as an auxiliary to other well recognized methods of treatment. If I desired a cleansing lotion, Boracic acid has been used freely, and where indicated, Atropine and other remedies have been faithfully applied, Pyoktanin being considered only as an auxiliary, the posi-

tion, it seems to me, it must occupy in ocular therapeutics.

Of the various preparations I have most frequently used the solution and pencil. The dusting powder I have used but little, it usually having been objected to by my patients. My first solutions were 1-1000, but of late I have used a solution of 1-500, and in the office I have used a 1-200, though I have never allowed the patient to use, at home, a solution stronger than 1-500; yet the solutions of 1-200 have never seemed irritating. My experience with Pyoktanin has been of a clinical nature, so I will make no attempt to refer to the theoretical side of the subject.

I have used it in a large number of cases embracing most of the diseases usually met with in ophthalmic practice. It would be a difficult task to classify these, and I shall use for illustration only those cases that I have been able to keep under observation and in which I have reason to believe the remedy has been applied satisfactorily, but my conclusions will be based upon a review of my experience as a whole.

Trusting this will be considered a fair treatment of the subject, I will proceed with the clinical portion of my report.

In the treatment of marginal diseases of the lids I have had no experience except where such conditions complicated other diseases, the peculiar staining nature of the drug having deterred me from its use in such cases in private practice.

In acute catarrhal conjunctivitis I have met with the same difficulty in following up the treatment, but I have been more fortunate in continuing the treatment in chronic cases of catarrhal conjunctivitis, especially in patients past middle life; these it has seemed to control very satisfactorily.

I have had but little opportunity to observe its action in cases of phlyctenular conjunctivitis, which is a source of regret to me, as I believe Pyoktanin will prove of service in its treatment. I have so far not been able to give it a satisfactory trial in cases of episcleritis, where I also believe it will prove of service.

I have been fortunate in having cases of purulent ophthalmia, and feel that I have given it a fair test, having had two cases of severe ophthalmia neonatorum, and a severe case of purulent ophthalmia in a young lady, where the infection evidently was caused by some carelessness on her part, as she was suffering at the time with a profuse leucorrhœa.

The attack came on while she was away on her vacation, and it was of some five days' standing, during which time she had little or no care, when I first saw her.

The right eye was so badly swollen one could hardly open it, and there was a most profuse muco-purulent discharge.

The chemosis overlapped the cornea, and had reached the raw beef-steak-like appearance. The cornea looked steamy, if I may be allowed the expression.

The left eye was of about two days' standing, but by no means as bad; still there was a profuse discharge, a most active inflammation and a marked chemosis.

She was menstruating at the time and suffering severe pain on that account, the combination of the two causing a nervous, hysterical condition which had about distracted the whole family. A condition of affairs that placed one at his wits' end to smooth out and get under control.

Fortunately, Phenacetine seemed to control the pain, and a skillful trained nurse did the rest. I ordered the eyes to be kept constantly cleansed with a Boracic acid lotion and a solution of Pyoktanin 1-250, dropped in the eyes every two hours and allowed to remain there for some little time.

The discharge in twenty-four hours became much thinner and the lids more freely movable; the chemosis seemed to be growing gradually less, this being especially noticeable in the right eye. The swelling of the left did not seem to increase; the cornea of the right cleared, and everything seemed to be progressing nicely until the third or fourth day, when a haziness was noticed at the extreme upper edge of the left cornea, a rather peculiar location for corneal trouble to commence, as the chemosis was by no means marked in this region, and at no time had it been as severe

as in the right eye. This proved the nucleus of a small perforating ulcer and a slight hernia of the iris.

As the rest of the cornea remained clear, I was unable to satisfactorily account for this state of affairs, but upon close inquiry I found that the eye was hit with the glass dropper, which no doubt lacerated the soft corneal tissue, and ulceration was the natural sequence of the purulent condition.

Still the damage was not as bad as might have been expected, and the vision of both eyes is still excellent. When I first saw the case I had no hope of saving the right eye, and so gave my opinion to the family physician; but the result of the treatment was a very agreeable disappointment. I am forced to give the credit, at least in part, to the use of Pyoktanin, though good nursing, as usual, no doubt, deserves the most credit. I will only speak of the two cases of ophthalmia neonatorum in a general way. They were both in the poorer class of society, their surroundings anything but hygienic. Being interested, I gave them more than usual attention, and tried to impress the importance of constant cleanliness upon the parents. Both cases were well developed when first seen, and one, without a doubt, was of gonorrheal origin.

The one of unknown origin was discharged, cured, at the end of two weeks. At the end of three weeks the right eye of the other was in good condition, and the cornea had not been affected. In the left eye the discharge was checked, but there was a small onyx between the layers of the cornea, and what the result will be I am as yet unable to state, as the case is still under observation.

The general result of this series of cases seems to be better than the average, especially considering the surroundings of the last two, and the severity of all the symptoms when first seen.

As a rule I think I can say that the action of Pyoktanin in corneal troubles has been marked and the duration of the disease decidedly shortened.

Mrs. N., aged sixty-four. Eight or ten years ago had a very severe inflammation of the right eye. This was evidently a mar-

ginal ulceration of the cornea extending well on to its surface. Since this time her eye has seemed easily irritated.

For these attacks she had been in the habit of using Atropine and Iodoform, which after a time controlled them; still it was sure to return in a few weeks.

At present she has a marginal ulceration extending one-third of the way around the cornea. She said she came to me for a change of treatment with the hope that I might be able to control the trouble.

I had but a few moments before received my first supply of Pyoktanin, and as it seemed indicated I decided to use it. In three days Pyoktanin and a lotion of Boracic acid had the attack under control, and under the use of Silicea 6x and a Boracic acid lotion, which she uses occasionally, there has been no return for a period of one year. So far I have used Pyoktanin in all corneal troubles that have come under my care, and, though none of them have been very severe, still I have been satisfied with its action in every case, and could report a long series of cases, but as its action upon the cornea is referred to so frequently in the subsequent cases of this paper, I see no reason to continue the list at this point.

Miss P., aged nineteen. Had sore eyes at twelve or thirteen years of age, since which time she has had very poor sight. At present she is suffering from an attack of interstitial keratitis. I ordered Kali mur. 6x, Pyoktanin, and Atropine.

In three or four weeks' time she returned to me quite well, as she said, and able to see better than ever before since her eyes were sore.

She is continuing the Pyoktanin and Kali mur., and I trust we will be able to improve her vision with glasses, as there seems to be some astigmatism.

Mrs. T., aged thirty-three, has had a number of attacks of interstitial keratitis. When I first saw her she could just tell that my hand was open or shut at a few feet distance. I first used Atropine in connection with the Pyoktanin, as the pupil was sluggish, but this was dropped in a week's time and for the past three months her only treatment has been Pyoktanin, and Kali. mur.

A few days ago I had the satisfaction of seeing her read with + 1. D. Sp. $\frac{5}{6}$. In this case the left eye has a very high myopia, and it is only possible to develop vision for large objects.

One of the strange things about this case is the fact that the left eye has never suffered from an attack of this disease ; perhaps it is, as her father said, not good enough to have any trouble.

Miss S., aged twenty. Has suffered with attacks of sore eyes off and on since childhood. The present attack is a most typical one of interstitial keratitis of syphilitic origin, the corneal haziness being so dense that the pupil could not be seen, and she had to be led into the office.

I prescribed Merc. cor. and Kali. mur., Atropine, and Pyoktanin. The acute symptoms subsided in about four weeks, since that time the haziness has gradually cleared and the vision has been improving. For a long time she has been able to make the trip of some twenty miles to my office alone, and I hope soon to fit her with glasses, and trust we may not be disappointed in the result.

I have used Pyoktanin in other similar cases and so far have no reason to feel that it was not of aid in the treatment of the case. It is true, I am well aware, that the acute symptoms of this disease are controlled by the usual methods of treatment, but it has seemed to me that my results with Pyoktanin have given better vision than it has been my custom to see.

Mr. H., aged sixty. Suffers at times with rheumatism and for the last six months has had inflamed eyes at times. At present he has a marked attack of iritis, with nearly a complete synechia posterior. For a period of two weeks I tried to control the disease with the usual remedies, but the improvement was slight if any ; I then added Pyoktanin, having just received the drug.

In a week's time the conjunctiva was clear. The Atropine was discontinued and the man returned to his home, the Pyoktanin being continued for a week or so, and during the past year he has had no return of the eye trouble, which is very different from the six months previous to the use of the remedy.

This was my first case and, as it seemed satisfactory, it in a way encouraged me.

Mr. B., book agent, had iritis of the right eye a few months previous, probably specific. The present attack had been coming

on for a week ; as the first attack lasted near six weeks he felt he was in for a similar confinement.

I prescribed Atropine and Pyoktanin, to be used three times a day. This controlled the pain, and on the eighth day the Atropine was discontinued and the man left town ; six weeks later he called one day and said he had had no further trouble.

Mr. B., aged thirty-five. A young man who for years has led a life of dissipation, but of late has from necessity been unable to do so, came to me with a severe iritis, which I think was of rheumatic origin, as he had many other rheumatic symptoms.

Some years ago he had an attack that lasted nearly two months, most of the time very painful, requiring hypodermics of Morphia to give him any rest. This time he had been suffering four days, and the night before he consulted me he had not rested at all on account of the pain. I ordered Atropine and Pyoktanin, and there was little or no pain from that time, and in less than three weeks I considered further treatment unnecessary.

Mr. L., aged twenty-four. Five or six years ago I treated him for nearly two months with a severe attack of rheumatic iritis. He has been a great sufferer from rheumatism, his feet hardly looking like feet, they are so drawn out of shape. This time he came to me after a week with a general physician who had used borax and water and hot applications for the pain, which had been severe. The pupil was almost occluded with lymph. I used Atropine and Pyoktanin and in two days the pupil was perfectly dilated and in less than two weeks the treatment was discontinued.

The results in that insidious form of iritis known as serous iritis or keratitis punctata, which steals on like a thief in the night, have been more than gratifying, its action making itself apparent in all stages of the disease. The attacks I am sure have been very much shortened in duration. Its action in this class of cases has been truly brilliant.

Mr. M., while splitting wood, was hit in the right eye by a flying stick, cutting the cornea nearly across, and evacuating the lens substance.

I saw him the next morning and prescribed the usual external cold applications, and for no especial reason I ordered a solution of Pyoktanin ; with but little other treatment the wound healed with almost no pain or inflammation.

Whether the Pyoktanin had aught to do with the case I am not able to say. This case was a severe one, but the recovery was rapid and comfortable, and if a similar case should come under my care to-day, Pyoktanin would be the first thing I should think of, as I consider it a useful anti-septic precaution.

Mrs. C., aged forty-seven. Came to me with an injured eye of many years' standing. At present the cornea, anterior chamber, etc., are completely disorganized, the globe shrunken, and for the last three or four years it has been a source of irritation most of the time; of late she has hardly been able to use the other eye at all. I advised enucleation, as the vision of the good eye was only $\frac{6}{15}$, but to this she would not consent. I ordered Pyoktanin dropped in both eyes, and to my surprise the improvement began almost at once.

At the end of three weeks the conjunctiva was white and to all appearance the eye was well. She now was able to use the eye for dressmaking and during the past six months there has been no return of the trouble, the vision of the good eye being $\frac{6}{6}$, though she says the upper line is hazy. The application of Pyoktanin has been continued at night with the hope that further clearing may result.

Mr. G., aged fifty-four, was hit in the eye some three days ago by a flying nail. When first seen there was a large triangular cut of the cornea, with bruised condition of the upper third of the cornea and a hazy appearance of the whole surface.

There was a marked chemosis of the conjunctiva nearly surrounding the cornea. The inflamed iris was entangled in the wound and attached to the capsule of the lens; the lens substance was oozing from the wound and a hypopyon occupied one-third of the anterior chamber. I could see nothing but an unfavorable prognosis, and so stated my opinion to the patient. I ordered Pyoktanin 1-500. In less than twenty-four hours the hypopyon had disappeared, the cornea was clearing, and in about two weeks my patient was at work again, the only evidence of irritation being a slight injection of the conjunctiva. I was able to observe this case closely and it proved a complete series of surprises. Every symptom seemed to change in a night to a steady

improvement. It seemed magical, and for once I was willing to excuse Prof. Stilling's enthusiasm.

Mr. M., aged twenty-four. Six weeks ago was hit in the right eye by a piece of steel. He has since been under the care of a careful specialist.

Still the eye has been a source of constant pain to him with but little change for the better for the past three weeks. Present condition : An irritable leucoma of cornea over pupil. Complete posterior synechia of iris. Lens opaque. Vision poor, if any perception of light. I was unable to learn whether the steel was still in the eye or not. I ordered a Boracic acid lotion and Pyoktanin 1-500, in a week's time he was at work, and he has had no further trouble, a period of some seven months.

Miss S., aged fifteen. Was hit in the eye two days ago by a sheaf of rye. Present condition : A long scratch across the cornea and a small hypopyon. I ordered Atropine and Pyoktanin. The next day hypopyon had disappeared, and though treatment was continued some days longer there was no return of the trouble.

I have recently treated a boy who had been hit directly in the eye by the flying end of a broken foil. The lad was a spectator at a fencing contest, and over eighteen feet away; but the broken end of the foil reached him, cutting the cornea, iris, lens, etc. I saw him within a few minutes of the accident and ordered Pyoktanin in connection with the other treatment; the eye healed with almost no irritation. At about the same time I saw a driver of a grain team, with a long cut in the cornea made by the knife he was using to open bags with, it slipped, and struck the eye. The knife was a dirty looking one used for cutting tobacco, etc., and in anything but an aseptic condition. This was treated as the other cases and healed without the slightest trouble.

I could add many other equally satisfactory cases to this list, each of which have seemed to me to have recovered quicker and better than similar cases usually do. Of late it has been my habit to use Pyoktanin after the removal of a foreign body from the cornea, especially if others have

been trying to get it out, the only result of their labors being an increase of the corneal injury. It is true that these cases usually do well, but some do not, and a little caution is surely on the safe side; if there is an area of haziness I continue the treatment for a day or so.

If for no other reason than the satisfactory results I have had with its use in accident cases, I would give it all praise and consider it indispensable in the treatment of this class of cases. None of us wish to have an accident befall us, but if it should, we wish to recover from the effects of it as easily as possible, hoping at the same time for little or no permanent defect.

The details of my cases may be said to be very general; this is so from the fact that I have not kept a daily report of their progress, having no idea at the time of putting them on record, and my only excuse for doing so at this time is the fact that Pyoktanin seems as yet to have attracted but little attention in the medical profession. Why this is so I am unable to say, as a careful review of my experience with its use leads me to believe that Pyoktanin has claims for recognition which must eventually demand the attention necessary to determine its real value. At first I frequently hesitated to use it on account of the staining, but I soon found that a little care in its application prevented this in a great measure, and of late I have heard little or no complaint on this account, as a ten per cent. solution of Castile soap in alcohol removes this quite easily. The method of its use demands close attention; a fresh solution is best at all times. I never depend upon one for more than four or five days, and this must have been kept from the light in a dark bottle. When applying it be sure that it is allowed to remain in contact with the eye for some little time, to give it a chance to be absorbed, never simply dropping it into the eye and at once letting go of the lids.

When using the pencil see that it is slightly moistened before applying.

For the details of treatment in the different classes of disease the reports of Prof. Stilling, published in *Merck's Bul-*

letin, should be consulted. I would quote them if it were possible to make a digest of them, but as one should be familiar with all he has to say, I will not attempt it.

In observing the action of Pyoktanin the attention is at once attracted by its rapid absorption, the cornea and iris quickly becoming discolored, showing an ability to carry its remedial virtues, if of value, to the very seat of disease, and as it penetrates these transparent tissues is it presumptuous to say that other structures more vascular are likewise in its power, and, if this is so, are we not justified in believing it able to carry its germicidal power with it?

I will now recapitulate my observations in a general way. Conjunctival troubles have done as well as with the usual methods, the purulent cases showing marked improvement in the character of the secretions, these appearing bland, and less in quantity in a few hours.

Corneal troubles have seemed to come under its control quickly, checking the tendency to spread and hastening the process of repair, cases of hypopyon keratitis disappearing as if by magic, and cases of interstitial keratitis clearing beyond expectation.

In iritic troubles it has apparently assisted the efforts of Atropine in breaking up adhesions, thus hastening and aiding the dilatation of the pupil.

The attacks have been remarkably short and the patients have complained so little of pain that I am forced to believe that Pyoktanin has certain analgesic properties. At present I am watching a number of cases where the disease has shown a frequent tendency to recur. Each of these patients is dropping two or three drops of Pyoktanin into the eye at night, the drops being allowed to remain in contact with the globe for some time to insure absorption. I am aware of the fact that the erratic nature of this disease will make it about impossible for me to establish my conclusions; still I may be able to satisfy myself and the patient. My experience in accident cases leads me to believe Pyoktanin is able to prevent the invasion of inflammatory germs. Should the future experiments with Pyoktanin, as I hope

they may, demonstrate its ability to sterilize previously healthy tissues against an invasion of destructive germs, its field of usefulness could hardly be overestimated.

With this idea in mind I have frequently used Pyoktanin after operations, especially in cases of strabismus and similar operations where the eyes are not bandaged. Whenever there has been inflammatory action after cataract extraction it has apparently aided in controlling it almost at once.

I have wished for a long time to observe the action of Pyoktanin in a case of glaucoma, but so far no case has come under my care, but as soon as such a case presents itself I shall keep it under close observation and report the result. My experience with Pyoktanin has given me confidence in its action, and I find myself depending more and more upon it in the treatment of my cases, which makes me wish that others would try it in a careful manner and report their results.

THE ARTIFICIAL MEMBRANA TYMPANI CONSIDERED AS A SPLINT OR CRUTCH.

BY HENRY C. HOUGHTON, M. D., NEW YORK.

This device for improving the hearing was brought to the profession by Toynbee, whose mind was directed to the matter by Yearsley, who published a pamphlet on deafness in 1840, advocating the use of the cotton pellet in cases of perforation of the drumhead. Mr. Yearsley was indebted to a New York gentleman for his impulse, as this patient consulted him and demonstrated that he could improve his hearing by introducing "a spill of paper previously moistened with cotton to the bottom of the passage." Thus we see that in modern times all roads lead to New York, as in ancient times they led to Rome.

Toynbee reasoned thus: "Under any of these circumstances it occurred to me that as an orifice in the membrana tympani by preventing the sonorous undulations, owing to their diffusion in the meatus, from being concentrated upon the membranes of the labyrinth, might be the direct cause of diminution of hearing power, so it was probable that increase of power would follow an artificial closing of the orifice."

"The preceding line of investigation led me to attempt the construction of an artificial membrana tympani which, it was hoped, might serve as a substitute for the natural membrane, so far, at least, as its function of closing the tympanum, and thus rendering its walls resonant, was concerned." (Toynbee, London, edition 1860).

The artificial drumhead undoubtedly does act to con-

centrate sonorous undulations on the auditory nerve, but it will do that by increasing the resonance of the temporal bone; it does it without reaching the membrana tympani. It does not even close the perforation in all cases, but its chief value is in supporting the remains of the membrana tympani and ossicula after extensive loss from suppurative otitis. In case of small perforations, a disc of paper, as suggested by Beale, a piece of silk, plaster, or even a film of mucus, will restore the equipoise of the ossicula for a time and cause temporary restoration of hearing, and the cotton pellet has been extensively used by aurists, although it is not practical for lay use.

A somewhat extensive comparison of the effects of the cotton pellet and the artificial drum-head led me to the opinion that in cases of extensive loss of the membrane, or in cases of small perforations with great relaxation of the tissues, any device which is effective in affording permanent relief acts by supporting the ossicula and restoring the equilibrium of the same. This will appear if one tries an ordinary rubber "drumhead" so called. Insert it as ordinarily sold, and it will act to increase the hearing in case of perforated membrana tympani, but on removal it will be found turned backward on the stem. Trim one to the exact size of the canal and it will not act as formerly. On inspection of the instrument in position untrimmed it will be seen to be turned back on itself, against the canal walls, the central portion being forced forward upon the remnant of the membrane and ossicula. Also inspect a rubber drumhead trimmed to the exact size of the canal. It will be found spread out to the periphery of the canal, in coaptation with the remains of the membrane, throughout its entire area. Now, if the rubber drumhead acts by simply closing the perforation, we should expect it to give better hearing in the latter relation, but such is not the case, hence we infer it acts as a splint or crutch.

Quite a number of writers account for the improved audition by supposing that the cotton pellet, the paper spill, or the rubber drumhead, cause pressure on the rem-

nants of the tympanic membrane, and force the ossicula inward, making increased pressure on the stapes. Knapp views the matter from the opposite ground, believing that pressure on the flaccid membrane and short process overcomes the retraction and relieves the pressure on the stapes, thus restoring the equilibrium of the ossicula. I believe he is correct, for we know that pressure on the processus brevis, in cases of retracted membrana tympani and rigid ossicula in otitis media atrophica, acts to relieve tinnitus aurium and improve the hearing.

These considerations led me to experiment on a large number of cases of large loss of the tympanic membrane, using absorbent cotton in the following manner: A piece of absorbent cotton is picked up loosely about as large as the area of one's thumb nail, thick enough to resist the passage of a blunt probe at the center. The cotton is laid into the meatus and pushed gently into the canal till the bottom is reached; it is then moved by the patient till the desired result is secured. I find intelligent patients soon acquire the educated touch, and can adjust the cotton better than the surgeon. In some cases patients prefer to roll the cotton round a wire stem, moisten it with vaseline or glycerine and water, and apply this instead of the rubber drumhead. This method has one advantage: it can be made the medium of local medication as long as suppuration continues; dry cotton is better when suppuration has ceased. It acts as a support for days, sometimes weeks, without change, and protects the tympanum from exposure to atmospheric changes.

The following histories may be of interest in this connection:

Miss H., aged twenty-six. Sent to me by the late Prof. Carroll Dunham, M. D., on the 31st of October, 1874, being then ten years of age. She had scarlet fever when four years old. Suppuration occurred in both ears, complicated by extensive sloughing of mucous membrane of pharynx, nares, mouth, and lips. The drumhead of right ear was gone, save falciform bridle; the long

process of malleus necrosed ; the mucosa of middle ear irritable, bleeding easily, discharging fetid, unhealthy looking pus. The left ear was even worse, no trace of ossicula to be seen. Prognosis unfavorable ; but by local cleansing with absorbent cotton and prohibition of the syringe, the surfaces were kept dry as possible. The internal remedies varied as the symptoms changed. Hepar, China, Tellurium, Calcareo carbonica, Psorinum were effective in restoring the function of the membrane till the secretion was muco-purulent and bland. Kali muriaticum and Kali sulphuricum have been the only remedies used in recent years.

In 1882 she could tolerate the cotton pellet with marked gain for the voice, on the right side, but it was of no value in the left. During next two years the hearing was much better, using the pellet almost constantly. Occasionally an irritation would arise, but a week without the pellet would be enough to allay it.

1884, September 27.—Substituted cotton rolled on wire stem for the pellet, but it could not be tolerated.

December 20.—On account of suppuration, Boracic acid with Calendula was used, and being blown in with force, it was noticed that the hearing improved at once, but not to the degree that was given by the cotton pellet.

1886, November 13.—Has depended on cotton pellet, or on powders blown into the ear. Calendula, Plantago, etc., with Boracic acid. On above date, packed the canal very lightly with absorbent, which gave admirable result.

1887, April 6.—Has tried "rubber drumheads" with no uniform satisfaction. Taught her to adjust cotton in the right ear. Under observation till November, 1887, with good results.

1888, September 21.—During last year has been in Europe, where she had no occasion to consult an aurist, although addresses were given on her departure. She used the cotton as a substitute for the pellet or artificial drumhead, and "heard very well, indeed," to use her own words.

Until the present time the conditions have been much the same. No treatment needed. The patient can adjust the cotton more promptly and certainly than I can with speculum and strong illumination.

Miss C. R., aged twenty-one. 1887, April 28.—Had scarlet fever when two years of age. Dr. Knapp directed her to use Car-

bolic acid solution, ten drops to one pint of warm water, to syringe the ears. Has used it for eight or ten years. Right canal, bland discharge small amount. *Mt* only border and flaccid portion left. Left canal, bloody pus. *Mt* same appearance as right side. Very bad odor from both. Syringe prohibited. Directed to cleanse with Hydrogen peroxide, dry with absorbent cotton, and blow in Calendulated Boracic acid. Gave internally Psorinum.

May 3.—The bad odor has ceased. R. canal, small amount of yellow pus. L. canal, *Mt* dry. Cleanse the right ear only. Gave internally Kali sulphuricum.

June 2.—Better. No pus. A little mucoid secretion.

July 13.—Since last visit, tried cotton, but did not succeed very well. Kali sulph.

October 12.—Better. Both canals dry. Is using the cotton.

November 9.—Had acute catarrh. Sneezing and blowing the nose. Displaced cotton, so she did not hear well. Trifolium?

December 8.—At menstrual period, ears run and bleed. Hyosc.

1888, January 10.—Perforations dry. Used antiseptic wool.

Until this date, October 7, 1891, she has been seen only occasionally once in two or three months, but the patient hears well, has been able to learn a trade, and goes alone, whereas she formerly did not dare to do it.

Miss V. S., aged thirty-four. 1889, April 20.—Had scarlet fever in childhood; cannot remember the experience. Has always had discharge from the ears. Hears watch on contact. Loud voice, five feet. Canals clear. Pus on walls of inner third and remnants of *Mt*, which are gone save periphery and superior portion. Manubrium necrosed. Ossicula retracted. Dried the undefined tissues. Gave Verbascum glycerole for local use, and Kali muriaticum internally. The eustachian tubes dilatable by Politzer's method. Then H. D. Watch, uncertain. Voice, $\frac{1}{2}$ ft.

June 1.—Seen once in two weeks since last date. She had a siege of otitis externa circumscripta, both ears, possibly from the irritation caused by the cotton or the Glycerole; but under Calcareo picrata, this ceased, and her general as well as local condition improved. Used absorbent cotton herself.

1890, January 18.—Doing well, but relapses under acute catarrh occasionally. Try Verbascum³.

July 7.—Has done well with the cotton, adjusting the cotton

dry, or using Glycerole if it is needed, on account of increased discharge. Kali mur.

1891, September 16.—Seen occasionally during the last year, about once a month. Condition much the same. Uses the cotton with good results, and is able to go everywhere without caution, whereas she was formerly timid on account of the difficult hearing.

POTASSIUM PERMANGANATE (KALI PERMAN- GANICUM) IN THE TREATMENT OF DIPH- THERIA AND ALLIED AFFECTIONS.

BY I. W. HEYSINGER, M. D., PHILADELPHIA.

Since about 1871 I have used the permanganate of Potash constantly in a specific class of diseases, and in a somewhat peculiar manner not generally known, and with most excellent results, which are not only established by my own constantly repeated experiments, but corroborated by the judgment of other physicians of repute, whom, at various times, I have induced to use the same remedy and in the same manner. As these uses are no longer experimental with me, and as the treatment has proven so successful in a class of affections greatly dreaded by the profession as well as the people, I am induced to make public the treatment I have employed, in the hope that it may lead to a more extended use among the profession at large.

I would first like to insist that physicians who may desire to use this treatment in the class of disorders to which it is adapted, may *begin* by using the treatment precisely and exactly as I shall describe it, leaving improvements and modifications to follow upon more extended use and experience. In 1875 I wrote a brief article, which was published in the *Scientific American*, of New York, and though not particularly addressed to physicians, led to considerable correspondence with me. I received many letters from members of the profession throughout the country endorsing the treatment in the most extravagant terms.

I am aware, of course, that the permanganate has been

used internally as a "disinfectant" in certain septic diseases connected with the stomach, and as a wash or gargle upon putrid or otherwise diseased surfaces; but the entire efficiency of the present treatment depends upon a fact which many will dispute, that the solution of this salt passes by osmosis directly into the circulation without decomposition, and which I think is new. Potassium permanganate is one of the most powerful oxidizers in the world; and it is practically, and in fully efficient doses, non-poisonous. Chromic acid and peroxide of Hydrogen alone approach it as oxidizers, but the former is a powerful poison and the latter is exceedingly unstable, and will not transmit its oxygen through the membranes into the circulation by osmosis, and it will not answer as a substitute for the permanganate in the following treatment. What effect the base, manganese, may have, I do not know, but as it is closely related to iron, chemically, and has important differences therapeutically, it should be carefully studied, but I have been so well satisfied with the permanganate that I have never had occasion to look further.

I use the permanganate in solution, and to many persons the solution (purple medicine, as patients call it) is somewhat disagreeable, especially to adults, but all take it readily, when confronted with the terrors of diphtheria, and the taste (which is not really bad, being a sort of mawkish watermelon-seed taste) is not at all persistent. A wash of water may follow it in the mouth, but *under no circumstances* must sugar, lemon, fruit, or other organic matter be immediately used before, with, or after this medicine, when given in solution. *Unvitalized organic matter* at once destroys and reduces the permanganate to an inert manganate, the oxygen is wasted upon the organic matter, and the whole is useless. But *vitalized organic matter* is not attacked, as is the case with Chromic acid, which will destroy warts or other excrescences, upon which the permanganate has no practical effect.

I use the permanganate in a weak solution of only about one grain of the crystals in two and one-half to three ounces

of pure water. It may be made up in tablets, and I have suggested to make the tablets of appreciable size, to combine the permanganate with Boric acid, as the Boric acid is of no special effect one way or the other, and it contains no organic matter, nor any material capable of being further oxidized. Such tablets should be prepared with the greatest care to avoid the slightest admixture of organic matter from the sugar, etc., used about the tablet machines or in the mortars or other triturating vessels. Otherwise, slow decomposition will ensue and the tablet will very soon become of a dirty brown color (instead of a rich dark garnet) and its efficiency in whole or in part, be destroyed. For such affections as acne, boils, etc., these tablets are very convenient, as each tablet, as now prepared for the market, contains about $\frac{1}{20}$ of a grain of the permanganate; but for acute diseases like diphtheritis, I always use the crystals, which are always pure, and which may be purchased at any pharmacy for a few cents per ounce.

The specific diseases to which I desire to call especial attention are diphtheria and diphtheritic scarlatina. Except when these diseases at once invade the larynx (diphtheritic croup) I think the treatment I describe will prove successful in all cases. But in diphtheritic croup, when early suffocation is to be apprehended, there is often not time to rely upon the permanganate, as, in my experience, I have never seen improvement set in in these affections, for a period of about twenty-four hours, and occasionally thirty-six or even forty-eight hours, during which the cure appears to be at a standstill, after which it progresses with startling rapidity to a perfect cure. Occasionally severe cases leave behind them paralysis, for a time, of some of the muscles involved in swallowing, as is commonly the case, due to ulceration beneath the deposits perhaps, but the general health is rapidly re-established.

Unless the physician can spare twenty-four hours, or thereabouts, for his patient, he should not undertake to use this treatment, and this emphasizes the importance of beginning early. Indeed when a case of diphtheria or scarlatina

appears in any family, I make it a rule to put the other children, and sometimes the nurse, immediately under the use of the permanganate. In such cases I have never seen the diphtheria extend to other members of the family. In these diseases (though as a prophylactic I use *only* the permanganate solution) I conjoin with the permanganate the ordinary homeopathic mother tincture of Belladonna, as it is a capital remedy in itself; relieves the fever, lowers the temperature, and seems to prepare the hyperæmic system for the more slowly acting permanganate, which follows, as one may say, like the heavy infantry after a brisk charge of cavalry.

On seeing a case of diphtheria, I prepare two solutions, one of a single grain (by guess work) of permanganate of Potash crystals in two or three ounces of water (a half tumbler full), stir till it is dissolved, and *at once* administer a teaspoonful to the patient. I then, in another half glass of water, dissolve about five drops of the mother tincture of Belladonna, and direct these medicines to be administered every hour *alternately*, and in bad cases every half hour. I use the same strength of solution of permanganate for children and adults, except in case of infants, when, with the same strength I use only a half or quarter teaspoonful. A teaspoonful is always safe, however, as the drug is not poisonous, except in much larger doses, and if nausea ensues, which is very seldom the case, I add more water. The solution should, by transmitted light, show a rich, dark claret color; not black (which is too strong), nor pinkish (which is too weak). Hence a dose of each is taken every one or two hours, which is quite sufficient. I use no gargles, washes, probangs, scrapers, or anything but the simple treatment above described.

I continue the treatment until the *very last* remnant of diphtheritic deposit has exfoliated and disappeared. It may be a week, or less, or two weeks. The cases are usually well in a few days, unless very serious constitutional damage has been done by the disease before treatment. In laryngeal diphtheria, where time is a vital element in

the case, other means may be resorted to to prevent suffocation; but the permanganate works perfectly well in these cases, if there be time, and, after its use for twenty-four or thirty-six hours in all cases, I feel easy about any supervention of croupous exudation.

Now for the *rationale*. In my short article in the *Scientific American*, about sixteen years ago, I stated that the obvious action was as follows: In diphtheria the blood is loaded with half vitalized *débris*, cast off by the specifically affected organs within the body. These floating impurities are albuminoid in character, and being such are incapable of passing the ordinary excretories of the body, and are retained, poisoning and putrefying in the blood. Nature's only remedy is to cast this off through the most sensitive parts of the mucous membranes, or the most rich in mucous follicles. Hence we find the deposits upon the fauces, larynx, vagina, nares, and various other mucous surfaces, as a sort of overflow, something pushed forward by the *vis à tergo*, which is the poisoned blood behind. Persons who die in the first stage of malignant diphtheria die with the putrefaction and septicæmia. If this be so, certainly to attack the membrane is like killing the policeman who announces a fire, in the belief that you have thereby extinguished the fire itself. It is curious, in passing, to note, since the recent advances in bacteriology and the theory of ptomaines now in vogue, how like it the above explanation is, as my views were the result of practical demonstrations by the permanganate itself, not only in diphtheria, but in certain other affections which I will mention below.

I concluded with certainty, from the compared results in various conditions, that the solution passed, in whole or part unchanged, into the blood, and that it *there* surrendered its surplus oxygen to the morbid *débris*, half-vitalized only and ready for attack, oxidized there into other material, dead and inert, and converted into substances capable of being eliminated by the ordinary emunctories of the body. The deposit in diphtheria does not continue to increase

after the permanganate is used; on the contrary it begins to crack into ragged divisions, like the mud-cracks of a dried up pond—these lift at their edges, and peel off, leaving the surfaces almost normal, *unless* malignant ulceration has gone on under these deposits *previously*. These are slow in healing and these are the cases sometimes followed by partial paralysis of the parts. Sometimes most brilliant results follow almost at once. I had a colored servant-man once in a family, in which I found seven all down at once with diphtheria. All recovered, of course, but the darky in the general demoralization crawled up to the garret to die, as he said, or rather mumbled, for he couldn't talk. His whole mouth, fauces, and nose were a mass of exudation, and the blood was running from his nostrils in clotted smears. The odor was over-powering. His pulse was slow and "shotted," as I call it. In four days this fellow was helping about the house, all well and sound.

Now I bespeak for this remedy, or rather both conjointly, the favor of the profession. I believe its general use will save thousands of lives and rob one of our "grim-mest" diseases of its terrors. I may add that my patients, who have known and tried this remedy time and again in their families (for diphtheria sometimes seems to run, like croup, in families as well as localities) feel perfect confidence in it, and frequently keep a small bottle of the crystals in the house to use before I can get to see any case which may arise, for they know the results achieved, and also the importance of early treatment. I think I can say that I have never seen this treatment fail, one case only was lost a few years ago, but it was a case brought home from a visit, and was putrid all through when I first saw it, and had developed diphtheritic croup before it reached home. I gave only a few doses of the permanganate, a half hour apart; and was then "scared off," and with a consulting physician, resorted to mechanical means to clear the larynx. This succeeded, but the patient sank at once

with septic poisoning, and died the next day. It was a child three and a half years old.

I may add that while the permanganate is perfectly antidotal to the diphtheritic element in scarlatinal diphtheria, it is not so to the scarlatina itself, and in such cases, as soon as the deposit disappears I go on with the treatment proper to scarlatina alone. No time is lost, however, as the Belladonna, and especially in conjunction with the permanganate, is a capital remedy for the scarlatina itself.

It has been urged upon me at times that perhaps the permanganate solution acted locally in its passage over the diphtheritic deposit, and not through the blood; of course the equally prompt disappearance of the deposit from other surfaces, and more especially the fact that the improvement first manifests itself constitutionally, and long before the deposit begins to disappear, and also the fact that while the old deposit remains no new accretions are received from beneath, all go to prove that the remedial action is from within, and is directly due to the absorption of the solution through the membranes.

But I am able to offer a much more convincing demonstration in an affection which manifests itself, not upon mucous membranes at all, and where any therapeutic action must of necessity be general and not local. I refer to ordinary boils. These come, frequently in crops, and appear, here, there, and anywhere, and are clearly the result of morbid germs, or poisonous obstructions of the smaller vessels in the skin, and of Nature's violent efforts to eliminate these elements as a last resort, through the skin, and of her failure to effect it without suppuration, a clear demonstration that the *débris* is such as is not fitted to pass the ordinary excretories. That this matter is morbid itself, is shown by the fact that simple obstruction produces gangrene, perhaps, or phlebitis, but nothing like true boils. Now in such crops of boils, or in single boils, the use of the permanganate solution produces remarkable effects. If suppuration has set in, the boil will go on to discharge, as the remedy has no action on pus, but if in the

stage of turgescient hardening and inflammation only, the boil will rapidly recede and, in two or three days, disappear entirely. I tell patients, perhaps, who have such crops of boils—"This boil will come to a head and discharge, for matter is already formed, but you will have no more of them." In such cases I use the permanganate solution alone, in doses an hour apart gradually diminishing in frequency. Patients like to carry it with them in a bottle, and take a small sip every hour or so. The tablets referred to above may come in well here, but I wish to say that my experiments have practically *all* been made with the solution of the crystals.

Pimples also, those annoying little boils which come with a stinging itching on the face, all disappear like magic, and for inflammatory acne contra-distinguished from those forms produced by filth or external disease, I know of nothing so effective; I have often said that an enterprising young man desiring to make a "Great Panjandrum and Blood Purifier" could find a wide market with the permanganate solution pure and simple, as a half dozen doses will make a convert in every case. And as an "appetizer" it is truly remarkable; far ahead of pepsin or the like; and in cases of torpid, sluggish digestive action, when people complain of feeling "loggy," tongue coated, spirits low, etc., a few doses will clear the entire atmosphere, and bring new life, appetite, and brightness. I mention these cases in corroboration of my theory of its action, as in all such instances we have the same loaded circulation, carrying about with it floating *débris*, incapable of being eliminated, and gradually depraving the fluids of the body, and impairing the functions.

It may be said, if these results are due to simple oxygenation, why does not the inspired oxygen so operate? It is well known that *nascent*, or freshly liberated, oxygen is much more active than ordinary atmospheric oxygen—it is like a wild animal just escaped from his cage and free in the midst of his enemies; while ordinary atmospheric oxygen is like the same beast asleep in the jungle.

I have spoken above of what I call a slow and "shotted"

pulse—in which the beats resemble the impact of a metal ball rolling along under a blanket. I conceive such a pulse to be due to the overloaded blood being incapable of properly stimulating the heart's action as it pours into the same. These albuminoids once oxidized, the blood clears, it springs along its channels freely, the heart responds, and the operations of life are carried on with vigor.

Now in a certain advanced stage or sort of typhoid or typhus we have a condition in which the patient just “hangs along,” there is no immediate danger perhaps, but the pulse is slow and “shot,” the tongue loaded all over with a thick pasty coating, a loathing of all food, a sluggish mind and slow speech; in such cases a few doses of the permanganate solution will transfigure the whole case. And yet it is no remedy for typhoid. In fact I have pretty nearly exhausted the list in the affections above referred to, and it will be seen that they all lie along the same narrow line which is characterized, in what might be called the general spectrum of disease, by depraved, half-vitalized, morbid albuminoids carried along in the blood, vainly seeking a natural outlet, and capable by oxidation in the blood, of being at once changed into simple *detritus*, adapted to pass the kidneys, bowels, skin, etc., by ordinary processes.

In cancers and like diseases I have found the permanganate useless; these nucleated and nucleolated cells are beyond it. In ordinary slow abscesses and in carbuncle it is useless, or nearly so. It has no action in measles or small-pox, and none in pure scarlatina. In blood poisoning it will do something, but has its limit as soon as its definite work is done upon the crude albuminoids. In typhus and typhoid, and also in malaria, it is useless. In the blood poison of rheumatism it is entirely ineffective. In ordinary skin diseases, eczema, herpes, etc., etc., it is of no use (internally, of course); and generally speaking, it appears to me to act only in one direction, and upon one sort of affections. But in such cases its operation is certain, and is often like veritable magic. My experiments have extended over many

years, and I was led sometimes from one class of affection to use the remedy in another inductively, and the results have fully convinced me that the action is due to absorption of the fluid, through the absorbent membranes, whether of mouth, pharynx, throat, or stomach, *unchanged*; hence the proportions I have named and the method of administration are important factors; and I trust that when members of the profession undertake to use this remedy, they will *first* demonstrate its effects in the precise manner I have indicated, to wit: a solution of, say, one grain to two or three ounces of pure water; the solution kept covered; the dose one teaspoonful, in conjunction with the mother tincture of Belladonna, about five drops in a half glass of water, same dose; alternately every hour or half hour, but usually every hour, in diphtheria and diphtheritic scarlatina; and the plain solution of permanganate, same dose every hour in recurring boils, etc., increasing the intervals to two, three, or four hours as the boils disappear or improvement results.

I have sometimes tested the remedy upon a single boil by keeping it in use for say twenty-four hours, then stopping the remedy for a day or two, then resuming it again, and so on, and observed the boil rise and sink like a tide, day by day, until I chose to push the permanganate along and eradicated the boil finally.

There is one matter more. I have been recently asked if I have ever clinically used the solution hypodermically; I have not. The solution can be readily so used in a strength of one grain to the ounce, or even two or three grains, without injury, and I know by trial that it will be readily absorbed unchanged; but it is a remedy which requires to be repeated frequently during each day, and the hypodermic administration is particularly difficult in general practice in such cases; while frequently patients carry the remedy about them at their work. As there are no after or toxic effects to be apprehended, and the solution is easily taken (with some little squirming perhaps), I have seen no advantage in using it hypodermically, and as my observa-

tions have all been clinical, or nearly all, I have not varied in the administration of the remedy from the methods above described. I think it would be of decided advantage, however, to use it steadily through certain cases by hypodermic injection, and communicate the results to the profession. This could readily be done in hospitals and the like. Such operations would be of decided value, especially for comparison with the results already determined. It might be possible that by such mode of administration the field of its usefulness may be extended into other fields; cancer, phlebitis, cystitis, and different affections of the spleen, liver, kidneys, lungs, and other organs.

I have noted its recent successful use in snake bites by direct insertion of the drug into the wound, enlarged for the purpose, and I feel very sure that further study along the lines above indicated will demonstrate still more fully the remarkable value of this remedy and extend the scope of its utility.

AN ORBITAL TUMOR.

BY B. B. VIETS, M. D., CLEVELAND, O.

Miss O., an unusually bright, interesting girl, eighteen years of age. There is no trace of cancer, tumor, syphilis, or skin disease in the family history. In June, 1889, she noticed one morning upon rising, that the upper lid of the right eye was slightly swollen. In a few hours, however, the swelling entirely disappeared. Every day for two weeks after this the lid would be swollen badly in the morning, gradually subsiding during the day. Then the entire lid began to look red and inflamed, and the swelling more pronounced and continuous. The family physician, Dr. DeForest Baker, was called. He diagnosed and treated it for erysipelas for several days, when he detected a small, firm, immovable mass beneath the orbital arch above the eye. In two weeks from this time, when I saw it, this hard, unyielding growth extended from inner to outer canthus, crowding the eyeball almost out of the orbital cavity. The entire cornea, together with a margin of the sclera, three-eighths of an inch in width both above and below, was exposed. The exophthalmos was so great the lids could not be forcibly closed. There was no pain or tenderness, and at this time not much redness of the skin over the growth. Vision in this eye was reduced to $\frac{10}{100}$, probably on account of the xerosis of the cornea.

Ether was administered by Dr. Baker. I made an incision through the integument $1\frac{1}{2}$ inches in length, following the curve of the orbital arch. Through this the growth was carefully dissected out—taking about three-quarters of an hour. It was firmly adherent to the periosteum of the entire upper one-half of the orbital wall, back almost to the optic foramen. It was wedge-shaped, the thickest portion being forward, which measured $1\frac{1}{4}$ inches in width, and $\frac{5}{8}$ of an inch thick, $1\frac{1}{2}$ inches long, quite thin and pointed

posteriorly. There were no attachments to the eyeball or the ocular muscles. The incision was closed with five sutures; wound healing by first intention.



Cut No. 1.

In four weeks from the time of the operation the eyeball had receded considerably, and vision was much improved. In two months vision was $\frac{10}{10}$, and the position of the eye-



Cut No. 2.

ball was normal. On account of the injury to the levator palpebralis, and branches of the third nerve during the operation, ptosis was complete. See Cut No. 1, from a photograph made at

the time. No effort on part of the patient could perceptibly change the position of the drooping lid. Galvanism was used for a couple of months at intervals of a day or two. Not the slightest improvement. I then made the operation described by Dr. Pagenstecher for partial ptosis, two sutures being used which were left in until suppuration was fully established. Not the least effect from the operation was noticeable. In a few months, I made Dr. Pagenstecher's operation for complete ptosis. The suture was made to cut out in little over a month. The effect of this operation was most gratifying. See Cut No. 2, from a photograph made soon after the suture had cut out. The scar, I think, will be hardly noticeable in six months. About $\frac{2}{3}$ of the pupil is uncovered. By exercising the frontalis muscle the lid can be raised still more, the lids also close readily.

The rapidity of the growth, the size of the tumor, and a successful operation for complete ptosis are the principal features of the case. Our diagnosis was: Firm fibroma from the grayish-white, fibrous, tendinous appearance, though on account of accident to the specimen no microscopic examination was made.

DIPLOPIA; PARALYSIS OF THE SIXTH NERVE.

BY C. GURNEE FELLOWS, A M., M. D., CHICAGO.

Diplopia is one of the most annoying subjective ocular symptoms, and one for which patients come demanding immediate relief.

Unocular diplopia being so comparatively rare, and binocular diplopia involving so many possibilities in the way of causation, reference will be made only to that caused by paralysis of the sixth cranial nerve.

A comparison of the ideas of the various writers upon the subject of the causation of ocular paralysis seems interesting, and perhaps more so since the balance of the ocular muscles is a subject receiving such general consideration.

The causes of ocular paralysis in general seem best grouped under the heads of systemic and traumatic. Syphilis undoubtedly stands at the head of the list as the most common systemic cause. Authors differ as to what proportion of the disease is assignable to this cause. Von Graefe believes that one-third of all cases are due to it; and although we may not be able to localize it, its existence, in the proportion mentioned, is undoubted. St. John Roosa assigns fifty per cent. of the cases to the same cause, and this seems to be the prevailing opinion of most writers; while Galezowski, claims that three-quarters of all cases of ocular paralysis depend upon a syphilitic cause.

Rheumatism is perhaps the next most important constitutional cause, and under this head we may place troubles arising from exposure to cold, wet, changes of weather, etc.

Glycosuria is mentioned by one author as giving rise

oftenest to paralysis of the sixth nerve, less often to paralysis of the third and fourth nerves.

In diseases affecting the nerve centers and brain, diplopia is present, but only as one of the many distressing symptoms.

Diplopia is almost always the result of strabismus, and the most troublesome diplopia is caused by a deviation too slight to be readily discovered.

The external rectus is the only muscle supplied by the sixth pair, and as it exerts no influence upon the vertical meridian, its paralysis affords the simplest example of diplopia, which symptom is important from the fact that by it alone we can easily detect the muscle affected, the progress of the paralysis, and it often becomes an aid in determining the means of cure.

On account of paralysis of the external rectus and the normal action of its opponent, the internal rectus, there is caused a convergence which, except in slight cases, is very noticeable. Homonymous diplopia is present, the two images being in a horizontal plane and upright.

The objective symptoms are: diminution of the arc of excursion of the ocular globe outward—adduction being stronger than abduction. The peculiar position of the head which is turned toward the side of the paralyzed muscle ; or the shutting of one eye.

The most prominent subjective symptom is diplopia, which is constant in the field of action of the paralyzed muscle and diminishes at the median line or beyond it, in proportion as there is partial or total paralysis of the sixth nerve.

The ordinary means for detection of diplopia and inaction of the external rectus are too well known to need repeating.

With paralysis of the abducens alone, the double images will show only lateral deviation and the distance between them will increase as the object is moved more toward the affected side, and disappear in the opposite direction.

In testing the excursions of the eye in complete paraly-

sis we cannot get the eye to move beyond the median line; but we may get a zig-zag motion outward by the combined action of the two oblique muscles. There may be either total or incomplete paralysis and the symptoms are accordingly more or less exaggerated.

The diagnosis of the cause is often difficult when we have but the symptoms diplopia and inaction of the external rectus present. Syphilitic paralysis is more apt to be sudden in its onset, and only one nerve and one muscle be affected; whereas in rheumatic or traumatic causes, general symptoms coexist or other muscles are affected in the same manner. This form of paralysis when due to syphilis is generally good evidence of the tertiary period. Diphtheritic paralyses are more general and almost always involve the ciliary muscle.

Ocular paralyses are often important as being the first sign of oncoming tabes or sclerosis of the cord; hence a variety of interpretations may be put upon them. We measure the degree of diplopia and the consequent strength of the external rectus by means of prisms. A prism, with its base out, which unites the images gives us the degree of diplopia. Low degrees of paralysis are easily overcome by prisms and in most of the affections a great relief may be brought about by adjusting them for use. But when a diplopia proves to be especially stubborn, the images cannot be united, or if so, do not remain—we may suspect a cerebral cause.

Oftentimes the diplopia is intermittent; in such cases the Maddox test will reveal the weakened muscle and our treatment may be directed against it before its reappearance.

Prognosis in paralysis of the sixth nerve is favorable in proportion to the freshness of the attack and extent of the affection. The prognosis is better in partial than in complete paralysis, and a diplopia showing only a lateral deviation is more favorable than one showing a difference in height of the two images.

In syphilitic paralysis the prognosis may incline toward

the favorable side if the lesion be not central or too deeply seated.

Paralysis may end in complete recovery, if of recent date and due to a peripheral cause, and the muscle may regain its former activity ; but more commonly the muscle only partially recovers and the condition remains permanent. In still other cases the muscle not only does not recover, but contraction of its antagonist takes place and we have a permanent convergence.

The treatment is medicinal, orthopedic, and surgical. It must vary with the condition present.

As a temporary expedient it may be necessary to exclude one eye from vision by an opaque glass in order to avoid the annoyance of double images and to prevent the awkward carriage of the head.

Electricity is generally advised as a prominent part of the treatment and the galvanic current is the favorite one. As far as remedial treatment is concerned it must be directed toward the cause so far as it can be determined.

Prisms, bases out, may be adjusted for a double purpose : First, to prevent the annoyance of diplopia ; but this is only possible when the diplopia is of comparatively low degree, as it is not well to give prisms of over 14° or 16° . Second, in order to strengthen by use the weakened muscle. To do this the prism should be found which corrects the diplopia, then one ordered slightly weaker in order to stimulate the muscle to greater activity.

It will be necessary sometimes to operate, but when is the question.

The best authorities say wait till all other means have been persistently tried for from eight to twelve months, when we may have the choice between a simple tenotomy of the internal rectus, or one combined with advancement of the external rectus.

REFERENCES : Galezowski, " *Maladies des yeux* ;" Royal London Ophthalmic Hospital Reports ; Schmidt-Rimpler, Meyer, etc.

SANGUINARIA: ITS EFFECTS ON THE THROAT, MOUTH, AND NOSE.*

BY J. L. CARDOZO, M. D., BROOKLYN.

Sanguinaria canadensis is well known to our allopathic brethren as producing more or less violent vomiting, according to the dose taken, and as an irritant to the nasal cavities. It is used by them as an emetic and expectorant, also in the form of snuff, to produce sneezing.

Homeopathy has found that it affects chiefly the respiratory mucous membranes, producing irritation and catarrhal inflammation. Also that it creates derangement of the liver and digestive tract.

We will, however, only consider it in its effects on the throat, mouth, and nose.

Sanguinaria gives us a dry throat, not relieved by drinking; the throat feels swelled, as if to suffocation, when swallowing; at other times it feels sore, as if raw or denuded.

It may even go over to ulceration, or else a pearly diphtheretic coating on palate and fauces will be noticed.

These symptoms are indeed very meager. But clinical experience has enlarged their number very much. One thing especially has been noticed so often, and by so many practitioners, that we may put it down as a guiding rule: "*Sanguinaria* affects almost exclusively the *right* side of the body; or at least, all disagreeable feelings or pains are worse on that side."

The Bloodroot is curative in some throat diseases, where

* Read before the Homeopathic Medical Society of Kings County, on December 8, 1891.

the throat is dry and tense, causing a sensation as if the throat is about to split. Burning in the fauces after eating sweet things ; burning in œsophagus, heat in throat. Drawing cool air over the heated membranes gives great relief. The patient, therefore, breathes continually with his mouth open. In these cases a mild gargle of Sanguinaria, in addition to the internal medication by the same drug, is very soothing.

In follicular sore throat, especially of the pharynx, when the membrane is red and shining, and the burning pain seems to extend backward, even from pharynx to stomach, the remedy will be indicated and curative.

In some forms of catarrhal ulceration of the throat, where the ulcer is superficial, and the above named symptoms are present ; where there is, moreover, a frequent desire to drink, to allay the burning, where *hot* drinks relieve temporarily, and *cold* drinks make it worse, Sanguinaria has often done good service.

It is also indicated in *pseudo-membranous croup*, not the mere spasmodic variety, but the kind characterized by the deposition of a fibrinous membrane in the larynx and trachea ; when there is dryness of the throat and sensation of swelling in the larynx, with expectoration of thick mucus ; *aphonia* ; steady, severe cough without expectoration ; tormenting, exhausting cough, with pain in the head and circumscribed redness of the cheek ; a hissing sound in the larynx ; the soft palate and fauces are covered with a coating of a pearly fibrinous exudation.

In an epidemic of this kind it has cured a great number of cases. Some practitioners, however, have in that instance used a preparation made of one grain or less of Sanguinarina (the alkaloid) dissolved in two or more ounces of vinegar.

They claim that the acetous solution acts better and prompter than the aqueous preparation. I, myself, have never used it in that form.

Is it ever indicated in diphtheria ? I think not. Dr. Holbrook, of Baltimore, though, recommends it very highly in that disease. Others, also, have found it curative ; but a large

number of practitioners have failed to see good effects from it. It seems to me that this difference of opinion is only a difference of name, or of diagnosis. Sanguinaria is curative in *diphtheric sore throat*, as the proving mentioned: "A pearly diphtheric coating *on palate and fauces*." In real malignant diphtheria, however, it is never indicated.

The effects of sanguinaria upon the mouth are; "Loss of taste, with burnt feeling on the tongue; sores on gums and roof of mouth." It is, therefore, indicated in *gumboil* (parulis), when *not* caused by caries; in *gingivitis*, when the gums are swelled, spongy, and bleed easily; not, however, when of syphilitic origin. In *epulis*, not of a malignant character, sanguinaria should be thought of.

In *odontalgia*, when the pain is aggravated by cold, but relieved by warm drinks; when other symptoms point to the remedy, and especially when the *right* side is the suffering part, it may do some good—though clinical experience has not confirmed the belief that it is of much value. Neither Hering nor Lilienthal makes mention of that drug among the medicines for odontalgia. In gingivitis and parulis, however, I have used the medicine with very good results. Especially the *nitrate* of sanguinarina, the 3d decimal trituration, has done good service for me.

Additional indications for sanguinaria are loss of taste; sweet articles taste bitter; tongue is sore, is red or white coated, with slimy, fatty taste. Tip of tongue burns as if scalded. Tongue pains like a boil, fetid breath, and sticky teeth. Its effects on the nose are: fluent coryza, with frequent sneezing, more in right nostril.

Here again, clinical experience has established some characteristic symptoms, to guide us in the selection of that remedy in particular. Principal amongst these are: copious, acrid, burning, watery discharge from the nose, causing an indescribable rawness of the Schneiderian membrane, with loss of smell; frequent sneezing; heat in the nose; coryza with dull, heavy pain over root of nose and in frontal sinuses.

Here we have a picture of acute coryza, which sangui-

nararia will cure. But also in its chronic form it is sometimes, not so frequently however, called for.

Especially that dreadful, miserable complaint, in which the mucous membranes of the nasal cavities are disorganized, thickened, and ulcerated—*Ozæna*, when not syphilitic, sanguinaria has often promptly cured. It was taken internally, and at the same time applied externally to the nasal membranes, after that organ was properly cleansed, so as to bring the medicine in close contact with the ulcerated tissues.

Sometimes we have another affection of the nose to deal with. I mean polypi. Here sanguinaria will often help us out, but just as often disappoint us.

Dr. Becker states that a polypus of the nose ceased to grow from the time the powder of the root was snuffed. Several physicians claim to have *cured* nasal polypus by the internal administration of the tincture, or a low dilution. Others again have failed. Some have noticed, that *soft* polypi were entirely cured by it. Later experience has taught us to distinguish between the polypi that readily yield to the sanguinaria treatment, and those upon which the medicine has no effect. Those that are called *mucous* polypi, caused by a hyperplasiæ of the mucous lining of the nasal cavity, are the ones whereupon the drug will act promptly and nicely, by a combination of local and internal treatment.

Another kind, the so-called gelatinous polypi, or a growth of a jelly-like substance, will also often be cured by it; though not so readily or surely as the former kind. On a third variety, called the *fibrous* polypi, which consist of a proliferation of connective tissue, sanguinaria has no effect whatsoever. This will explain the success of some, and the failure of others in treating these cases.

From what we have said, it will be seen, that sanguinaria is certainly a curative agent in many diseases of throat, mouth, and nose. But the cases must be *well* selected. The symptoms must be prominent and well defined. A failure of this precaution will often result in great disappointment.

You have noticed that we mentioned the *nitrate of sanguinarina*. We, ourselves, and many others have used it, in place of the drug itself. Why? Because clinical experience seems to point to the fact that it acts more promptly. As far as I know, we have no proving of the *nitrate*. I suppose there *is* a difference between the two preparations; what that is I am unable to say. A proving alone must settle that question. Until then, I will continue to use one or the other, as I imagine that experience has taught us, according to the testimony of several of my fellow-practitioners.

CATARACT EXTRACTIONS AT THE ROYAL OPHTHALMIC HOSPITAL, MOORFIELDS, LONDON.

BY HAYES C. FRENCH, M. D., SAN FRANCISCO.

In our last we took a general view of Moorfields, paying little attention to personal preferences or peculiarities in its surgical staff. In this paper we shall aim to present in brief the methods, and some of the differences as seen in the cataract operations of these men whose fame as ophthalmic surgeons is deservedly world-wide; and if we note apparently insignificant details, the importance of the subject, and the universal eagerness of the average oculist for practical knowledge on this particular theme, shall be our excuse.

The general preparation of the eye for the operator is the same in all cases. Except in extremely timid or nervous persons, cocaine topically applied in about four per cent. solution is the only anæsthetic used. The globe and interpalpebral space are thoroughly irrigated with a warm solution of boracic acid, which, in answer to a query, Mr. Nettleship told the writer he believed was a saturated solution, remarking that in his opinion pure water would be equally efficacious.

The instruments were invariably a Birmingham speculum, a Von Graefe cataract knife, made by Weiss, of London, with a strong back, and wider blade than those commonly made and used in America. Their cystitome is a delicate and slightly curved knife on a slender shank, somewhat resembling Knapp's secondary knife, or needle. A delicate tortoise shell spatula, and an ordinary fixation and iris for-

ceps complete the outfit, all of which were submerged in a boracic acid solution contained in a porcelain tray.

Mr. Nettleship is a slenderly built man of from fifty to fifty-five years, of nervous temperament, with a keen but kindly eye, and is a neat and expeditious, though not rapid operator. He freely and frankly criticises his own work, and there is an air of candor and sincerity about him that fits charmingly his great ability. He is intensely practical, and imparts knowledge to all inquirers in a manner that shows the pleasure of a true teacher. He employs the fixation forceps and almost invariably performs his extractions without iridectomy, though he is reported to have said that in his opinion the entire profession would ultimately return to the iridectomy in cataract extractions. In one case of extreme myosis it was the whispered opinion of all observers that he would depart from his rule, but to our astonishment and great admiration he extracted an unusually large lens through the contracted sphincter with as much apparent ease as though it had been fully dilated. He makes his cut ample and well into the sclera, and when asked his objection to a preliminary iridectomy in those cases in which he found one necessary, he said that he preferred a long conjunctival flap, as offering the best condition for healing of the cornea, and in his opinion the preliminary iridectomy interferes somewhat with that desideratum. To secure the flap requires considerable deliberation in making the cut, and after cutting through the sclera the edge of the knife must be kept well down toward the globe. To tilt the lens forward into the wound he employed sometimes the Daviel spoon, sometimes the tortoise shell spatula, and once a rubber scoop.

All the incisions we saw in the hospital were made in the superior segment of the cornea. He exercises great care in removing all cortical substance from the aqueous chamber, which is rendered more difficult by the large conjunctival flap, sometimes waiting for the anterior chamber to refill several times. The iris is then carefully smoothed out and freed from the wound, and the lips of the cut are

brought into perfect coaptation by means of the spatula. The freedom with which he entered the chamber sent one of our most solemn and cherished maxims to grass.

Mr. Tweedy is a man of about forty, of motive temperament, with large causality, and is decidedly original and independent in his views. He differs from all the rest of the staff in making his cut without in any manner fixing the globe save with the knife, with which he transfixes it. The only reason he offered for this radical departure from an almost universal custom was that it prevented irritating the conjunctiva, which to our minds seems a small advantage for the risk entailed, though we were told that he had never yet met with an accident. Thus one by one our ghosts of fear are laid. He employs an iridectomy at the time of operation, and a long conjunctival flap, remarking that while it often becomes displaced during the extraction, it could be easily replaced afterward. He also spoke of the necessity of making the last part of the cut slowly to secure the desired flap. In opening the capsule he again makes somewhat of a departure from established usage. After making the flap he reintroduces his Von Graefe knife and makes a clean cut along the presenting edge of the lens, thus preserving the anterior surface of the anterior capsule intact. In defense of his method of opening the capsule he claims better results in vision and fewer secondary cataracts than by the other plans.

Mr. Gunn is one of the younger members of the staff, and a man of great promise, whose operations differ little from those already described. He does his work with matchless neatness and precision.

Mr. Cooper does not look to be over twenty-eight, though he operates with the coolness of a veteran. His senile cataract operations differ in no essential particular from those of Messrs. Gunn, Morton, or Lawford. In a case of traumatic cataract in a young man of twenty-eight, with an exceptionally tough anterior capsule; having made an ample linear opening into the anterior chamber and a generous iridectomy, he seized the anterior capsule about

the center, with a strong toothed iris forceps, and removed a large portion of it by a pulling and twisting movement. He says he frequently and successfully performs the operation in cases of this kind, afterward removing the soft matter by the usual method, taking great pains to restore the iris and secure perfect closure of the wound. To sum up the points of excellence in these operations upon which we can reasonably predicate the good results we should name :

1. Their strict attention to the aseptic conditions preceding, attending, and following the operations.

2. The uniform deliberation and smoothness of the operations, aided by the ambidexterity of the operators.

3. The great care that is exercised in removing all cortical substances from the chambers, the restoration of any prolapsed portions of the iris, and the perfect coaptation of the lips of the wound.

The editors of this JOURNAL, in an early issue, seeing the grave importance of the subject, solicited the opinions of the oculists of our school as to the best methods of cataract extraction as based upon their personal experiences; and no one who has carefully read and compared those reports will doubt that the enterprise has been one of the most important features of an exceptionally successful journalistic venture. In studying carefully the methods of our transatlantic colleagues, every close observer will be impressed with the unanimity of sentiment between the surgeons of the two continents upon all practical points involved in cataract extraction. The cutting instruments employed by the London oculists are undoubtedly the best in the world; and they surpass us in the thoroughness of their training, which is largely due to the vastness of their clinical advantages over ours. There is no doubt in our mind that the greater destitution among their poor renders senile cataract more common in England than in the same class of Americans. Many of England's poor avail themselves of gratuitous clinics, while our people of the same class, for so important a service, would find friends ready to fee a

specialist in hope of a better result. Nothing but long experience and a painstaking training could bring a class of men, varying in mechanical genius, in temperament and nervous impressibility, to such a marvelous uniformity of excellence as is witnessed in the delicate technique of the Moorfields surgical staff.

A CASE OF APOPLEXY OF THE RETINA.

BY F. LINDLEY HOAG, M. D., GRAND RAPIDS, MICH.

July 17.—Miss P, aged twenty-two, Swede, consulted me for sudden blindness of left eye, which had occurred that A. M. About one week previous had similar attack which immediately passed away. Made no complaint, except the blindness.

Test gave O. D. $\frac{20}{20}$; O. S. $\frac{30}{20}$.

Tension normal.

Dilated pupil with cocaine. Upon examination with the ophthalmoscope found large hemorrhage lying between macula lutea and optic nerve. I recalled the remarks of the late Prof. Norton that in these cases we would find from two to an indefinite number, so made a careful search and concluded that this one was the indefinite number, as no others were found. The hemorrhage was very large, extending from near (about 2 mm.) the optic nerve, to about 6 or 8 mm. beyond the macula and perpendicularly about $\frac{1}{2}$ inch in breadth. The edges lying above, below, and near the optic nerve, were steep, abrupt, and well defined. Toward the macula the hemorrhage seemed thinner, and appeared to divide and encircle the macula. This edge looked striated. Was the hemorrhage in the nerve fiber or deep layer? Taking into account the size of it I concluded that it was in nerve fiber layer, and the fact that $\frac{30}{20}$ vision remained, led to the conclusion that the macula lutea was not injured. Just why the hemorrhage should kindly divide and embrace, rather than destroy this valuable spot, was a mystery to me. I made a thorough examination of the case to discover the cause but was unable to find any reason that would account for it. The outlines of nerves, arteries, veins, and remnants of retina were normal. Owing to there being $\frac{30}{20}$ vision left I gave a favorable prognosis. Treatment: Of course I advised complete rest for body, eyes, and soul, all of which she

refused to comply with, and insisted on following her daily vocation. I gave Crot. horr. 3x.

July 20.—Vision $\frac{3}{200}$, but upon examination with ophthalmoscope was unable to make out the optic nerve or in fact to see any of the retina. The vitrous seemed filled with blood. R. Crot. horr. 6x.

July 26.—Reported vision : perception of light. At this examination I was unable to get a reflex from eye, except when she looked well upward and to the nasal side; changed prognosis, and gave Crot. horr. 30, and Phos. 3x.

She reported occasionally from that time until August 21, with no material change. I looked for and expected increased tension, but found none. During the time she received Crot. horr. 30; Phos. 6, Bell. 3, and Duboisia, 3 and 6.

At this visit I noticed the patient pull at the neck of her dress, so I thought I would do likewise, and found her collar loose and plenty of space for the air to circulate. I elicited the fact that everything about her body seemed tight, when loose. I gave Lach. 12x. As I soon went away on my vacation, did not see the case again until September 7, when I found vision $\frac{2}{100}$, and repeated Lach. 12.

September 15.—Vision $\frac{2}{300}$. R. Lach. 12.

October 1.—Vision $\frac{2}{200}$.

I then realized my stupidity in being so long in finding the similimum. I have reported this case, not because it presented anything new or strange from a diagnostic or pathological point, but from a therapeutic standpoint. I have not been able to get such marked and glaring results from my internal medication in special work as I did in general practice, and hence at times wondered if I was a homeopath. But the case renewed my love for the Law, and I report it in the hope that it may cheer some other young brother in this great field.

RUDIMENTARY SEXUAL ORGANS ASSOCIATED WITH ATROPHY OF THE OPTIC NERVE.

BY F. F. CASSEDAY, M. D., MINNEAPOLIS, MINN.

In March last I was called to examine E. J., a girl fourteen years of age. She had been blind in both eyes for nearly fourteen months. Nine months previous to loss of sight she fell while playing on a pile of lumber, and was struck on the head by a plank, rendering her unconscious for some time. Patient is of fair size, apparently well developed for her age, has a good appetite, sleeps well, and is quite cheerful.

Dr. C. G. Higbee made a careful and exhaustive examination of the child's sexual organs at this time, with the following result: The external parts were small, the vagina short and narrow, and the uterus rudimentary, being not over an inch in length. The ovaries and fallopian tubes were entirely wanting, not a trace of them being found. Ophthalmoscopic examination revealed marked atrophy of the optic nerve in both eyes. The atrophy of the optic nerve may have been primary and associated with the rudimentary sexual organs, or it may have been secondary to and dependent upon the severe blow upon the head when the child fell from the pile of lumber. The child died two months after the examination.

THE NECESSITY OF NASAL RESPIRATION.*

BY EUGENE L. MANN, M. D., ST. PAUL, MINN.

The air which we are constantly breathing is supposed to contain nitrogen, 79 per cent.; oxygen, 20 per cent.; carbonic acid and a few other ingredients in small proportions and as necessary evils; but an examination of the air of any city of considerable size would give such proportions of carbon, silica, animal matter, etc., as would startle us and make us wonder, not that respiratory troubles are as prevalent as they are, but that they are not more common. Besides these deleterious ingredients, the air is also subject to rapid changes in temperature and moisture—especially is this the case during the winter months, when in passing from a heated room to the outer air we change abruptly from a temperature of 70 or 80 degrees above to 5 or 10 degrees below zero.

In the advance of civilization it is necessary that man should be surrounded by such an imperfect medium and yet keep the delicate structures of the larynx and lungs inviolate; and Nature has enabled him to do so by placing in the very beginning of the respiratory tract an organism peculiarly adapted for the work it has to perform.

The Nasal Turbinated Bodies.—These bodies are in their structure cavernous venous plexuses under the control of the vasomotor system of nerves, and so nicely attuned that, responsive to the slightest irritant, be it undue dryness or cold or foreign matter, they dilate and fill with blood, thus forming an obstruction to foreign material; and by the in-

* Read at the Minnesota State Homeopathic Institute.

creased circulation and partial venous stasis furnishing heat and moisture. Thus the air, before it reaches the larynx, is not only sifted of the foreign and irritating material, but furnished with moisture ; becomes not only pure and moist, but also warm—perfectly prepared to enter the lungs without injury.

Every physician sees the necessity of preparing the air after a tracheotomy, and in his anxiety (lest the patient contract pneumonia or a violent bronchial inflammation) recognizes, unwittingly it may be, this function of the nose. One of the main advantages of intubation over tracheotomy lies in the fact that it does not interfere with nasal respiration and render the patient liable to these inflammatory conditions.

But, though unconsciously recognizing this function in these cases, we in many others fail to realize its importance. Many cases of pharyngeal irritation, of cough and hoarseness, have been treated constitutionally and locally for long periods, often with no improvement or only temporary palliation of the difficulty ; and the entire trouble has subsided and become permanently cured when treatment has been directed to the nasal space, and to the correction of obstructed nasal respiration. Nature doing all the healing necessary when the parts were no longer congested by an irritating air.

The fears of the laity are daily preyed upon by quacks, especially those with some infallible nostrum for sale, who boldly assert that nasal catarrh, if not arrested, develops into consumption ; and we occasionally hear remarks of a similar import from the physician himself. While recognizing the distinct identity of tubercular disease and the impossibility of its development from the extension of a nasal catarrh, we are still alive to the fact that an inherited weakness of the lungs may be emphasized and brought into activity by constantly breathing an air that has not been rendered non-irritating by nasal respiration.

The consideration of these facts leads easily to the assertion that the nose is the first, and I had almost said, the

most important organ of respiration. If other arguments were necessary they could be brought; the very anatomical structure itself is indicative, the nasal fossæ being lined with the great respiratory epithelium (the same that lines the bronchial tubes), the ciliated variety, while in the mouth and pharynx we find a totally different kind, the tessellated, or pavement epithelium.

Allied in structure and in function, the nose certainly belongs to the respiratory tract and on its healthy functional activity depends the integrity of all the remaining portion. Its diseases are likewise deleterious not only from their local effect, but because the local disorder interferes with the proper preparation of the air, consequently the larynx and lungs are subjected to constant and continuous excitations.

While thus dwelling on, and emphasizing the importance of nasal respiration to the integrity of the lung structure, we must not overlook another important function—the proper aëration of the middle ear and the activity of the eustachian tubes. The mouths of these tubes open into the post-nasal space just behind the inferior meatus and some of the air drawn in by the respiratory act passes along the tube and into the middle ear aërating it and keeping it in a state of health. When from any cause the nasal fossæ are obstructed and mouth breathing rendered necessary, the air no longer passes by, or is forced up into the tubes; they become partially or entirely closed, the air in the middle ear becomes rarified, a chronic inflammation is started, and deafness results. Dr. Curtis, of New York, says that the rhinologist necessarily becomes an aurist, and reports many cases of deafness in all stages—all relieved, and many of them *cured*, by simply re-establishing nasal respiration in cases of obstruction; such an experience is not in any sense exceptional.

Another, though perhaps a less important, function of nasal respiration is the preservation of the olfactory sense. A small obstruction in the respiratory area suffices to prevent the odoriferous particles from reaching the olfactory

region above, and the sense of smell is lost—a sense not as important, perhaps, as audition, but one that many times prevents disease by warning us of an unhealthy atmosphere or a tainted viand and one whose influence over the appetite must not be underrated, as it is a well established fact that the appreciation of flavors depends upon the sense of smell rather than of taste.

The influence of nasal respiration on the human voice is something that we are all familiar with; the disagreeable, choked-up monotone that goes with obstructed nasal breathing, has come to the notice of us all, and even slight degrees of obstruction materially interfere with singers, especially in taking the upper notes.

Finally, the effect of mouth breathing on the facial expression has not escaped notice. The dazed, vacant, almost imbecile features of the child who is obliged to breathe with open mouth is a not infrequent and an easily recognized condition; and the change of expression to one of intelligence and brightness, following the re-establishment of nasal respiration, is interesting and instructive to watch.

It would too greatly prolong this paper to even briefly review the various causes of obstructed nasal respiration and their treatment. I shall make a mere enumeration and but one general statement as to treatment, namely: That it is essentially surgical in character.

The most classical cause of nasal obstruction is polypus, the most frequent, hypertrophied turbinated bodies. Besides these, deflected septa, septal growths, tumors of various kinds and classes, either within the nasal cavities or in the post nasal space, are active agents. Each case must be studied in and for itself, the proper nature of the obstruction determined, the appropriate treatment instituted; then in no class of cases are the results more satisfactory.

In conclusion let me emphasize the importance of nasal respiration for proper voice production, for perfect olfaction and audition; but above all and before all for preserving the integrity of the whole respiratory tract and lessening the liability to throat and lung diseases.

GLYCERINE-COTTON PLEDGETS IN ATROPHIC RHINITIS.*

BY HORACE F. IVINS, M. D.

The object of this paper is to call to your attention that form of *local* treatment, which, in my hands, has nearly supplanted all other *topical* measures. I do not advocate this treatment to the exclusion of internal medication, but simply as an adjunct to the homeopathic remedy, the latter being prescribed when possible, upon general, broad indications.

The cotton tampon, as advised by Gottstein, yielded me practically negative results; therefore I decided to attempt improvement. I first moistened the tampons with the various preparations which I had found useful as sprays in atrophic nasal catarrh. The soda solution gave little better results than the dry cotton tampon. Next were tried the numerous petroleum preparations, and of these, fluid albolene proved most valuable.

Feeling that something still more efficacious might be found, I tried, among others, that which of all seemed least indicated, namely—GLYCERINE. To my great astonishment and delight this gave such decided and prompt relief that I was tempted to doubt either the remedy or the diagnosis. Forty-eight hours later, however, the old annoyances began to show themselves, one by one; this led to a repetition of the treatment and the favorable results.

My reason for not trying the glycerine sooner was that its well-known affinity for water and its relief to copious discharges and hypertrophic conditions, seemed to contra-

* Read before the Homeopathic Medical Society of Pennsylvania.

indicate its efficiency in a disease where atrophy prevails, and where the discharges are so wanting in fluid as to dry immediately upon exposure to the air. It was with some hesitation, therefore, that I made the venture, lest my patient's condition be aggravated.

The action of the glycerine, applied in this manner, seems to be that of exciting the sluggish mucous lining to renewed activity, causing it to pour out its secretion in such quantity as to loosen the dried, hardened formations and dissipate the unpleasant odor.

The method of application is very simple and, at first, can be carried out almost as well by the patient as by the physician. Later, however, more care is needed in placing the pledget. A small quantity of absorbent cotton, nearly large enough to fill the nasal passage, is grasped at one end by a pair of light forceps. The pledget is moistened in pure glycerine, almost to saturation, and is introduced, through the nostril, well into the lower meatus. In a few minutes the slight smarting sensation, arising directly after the introduction, gives place to a feeling of relief and to a free, watery nasal flow. When the latter is established, rarely requiring more than ten minutes, the nose should be blown vigorously, freeing the cotton. The blowing should be continued as long as any discharge can be forced from the nasal fossæ.

It is scarcely necessary to state that the cotton should be introduced into one naris at a time; a second piece can be passed into the other as soon as the first passage is entirely cleared. The second side, however, does not always require treatment, as the excitation occasioned in the one is often reflexly transmitted to the other. The application should be made twice a day, until marked relief is secured; then the morning application will prove sufficient. This should be continued for several weeks, and less frequent treatment should be continued for a year.

Owing to the irritating effect of pure glycerine upon the naso-pharynx, the patient should not lie upon his back while the pledget is in position.

In preparing the cotton, packing is to be avoided; the mass should be left in a loose, fluffy state. Should the watery flow fail to occur, it may be concluded, that either the pledget is too small or that too little glycerine has been used. In either case the first piece of cotton should be removed and a second and more suitable one substituted. At first the lower meatus alone need be treated, but afterward the application should be made where the dryness or discharge appears.

It might be thought that the repeated, profuse secretion occasioned by the use of glycerine would be followed, after a time, by an aggravation of the dryness. This I have never seen, nor have I ever observed an unfavorable symptom traceable to the use of glycerine pledgets in atrophic rhinitis.

The symptoms indicating the use of this treatment are a fullness, pain, dryness, and burning in the nasal fossæ; offensive odor, frontal headache, and, often, difficult or non-concentrated thought (aprosexia). The relief following the use of the pledget is often so prompt as to make the patient feel that some anæsthetic has been used, or that a super-human power is at work.

Although I have never found any measure at all comparable to it, in cases in which the preceding symptoms were present, I do not consider cotton-glycerine pledgets infallible for the cure of atrophic rhinitis.

STUDIES OF IRIDOCYLITIS AND OF ATROPHY
OF THE BULBUS OCULI, WITH COMMENTS
ON DR. EMILE BERGER'S RESEARCHES
AND ANATOMICAL PLATES ON THE AL-
TERATIONS OF THE OCULAR GLOBE.

BY H. H. CRIPPEN, M. D., SALT LAKE CITY, UTAH.

(Continued from page 331, vol. iii.)

Causes of Œdema of the Cornea.—Having taken up those alterations of the corneal tissue that are indicative of an increase of its imbibition of serum (the enlargement of the lymphatic lacunæ of the parenchyma and of the intercellular fenestræ of the epithelium), there remain a few words pertinent to a discussion of the causes of these changes. In *iridocyclitis* a very marked cause for the origin of œdema of the cornea is certainly to be found in the inflammatory alteration of the peripheral vascular ring. From this results an excess of transudation, as proven by the experiments of Klemensiewicz. To this increase of fluid must be added an augmentation of the permeability of the vessels for liquids and a contraction of the caliber of the veins caused by the exudations surrounding them.

Arlt believes in the same causes as productive of œdema of the cornea in glaucoma. "I have found it most probable that this œdema presenting in the anterior (superficial) layers of the cornea, is in relation with the peripheral vascular ring of the cornea, and therefore may be considered as proceeding from these vessels. If the flow of blood is diminished, the consequent œdema must develop in the most distant part, that is in the center of the cornea."

“In iridocyclitis, the alteration of the peripheral vascular ring and of the endothelial cells of the cornea must be regarded as the cause of the œdema. I attribute to this latter alteration the difference in the localization of the œdema of the cornea in glaucoma and in iridocyclitis” (*Zur Lehre vom Glaucom*, 1884).

Oeller believes that the alterations in the endothelium in iridocyclitis is caused by the chemical alteration of the liquid contained in the anterior chamber. To this may be added Leber's proof, that the penetration of liquid into the cornea is, in the normal condition, prevented by the endothelium of Descemet's membrane. Œdema of the cornea begins after death at the point where the endothelium of Descemet's membrane is found detached. As a consequence of the alterations of this endothelium in iridocyclitis the current of liquid is not impeded in its passage into the corneal parenchyma. Thus it is that the layers contiguous to the anterior chamber are the principal seat of the œdema. In atrophied eyeballs, without any inflammatory alteration of the cornea, or when this alteration is of slight degree, the loss of the resistance proper to the endothelium is the chief or even the only cause of the corneal œdema.

There still remain for explanation some cases of iridocyclitis, in which we find a plexus of highly developed vessels, where may be observed an œdema that is only recognized in a *longitudinal* section. On this point Berger states that the cause seems to be in the vessels, which produce the transudation and which are at the same time the passages for the discharge of the nutritive fluids. It is also necessary to mention that in the most advanced periods of iridocyclitis, where a great number of vessels are found, the inflammatory alterations diminish, and that it is probable in these cases that the transudation of the fluid of the anterior chamber is the chief cause of the increase of the current of the liquid.

As a proof of the active *rôle* of the vessels in the transportation of nutritive fluid, may be mentioned the following: Memorsky has found by experiment that diffusion by

the cornea is more rapid in the enucleated eye than in the eye of the living animal. To this Leber adds, "I believe that the difference depends on the fact that, this circulation persisting during life, a part of the substances diffusing in the anterior chamber is continually transported by the blood vessels, consequently in certain circumstances a quantity (of substances), capable of producing a reaction does not exist."

SCHLEMM'S CANAL.

Exudation.—In the first stages of the development of iridocyclitis Berger found Schlemm's canal inclosed by exudation. The tubes which compose it contained red blood corpuscles and lymph cells. In transverse section one part of the venous plexus may be obliterated while another portion may present enlargement.

Obliteration.—In the late stages of iridocyclitis Berger has found pigment granules in Schlemm's canal. He describes the walls as thickened and as apparently affected by an obliterating inflammation. In atrophy of the bulbus this author never has found a trace of Schlemm's canal.

The same pathologist is authority for the statement that the alterations found in iridocyclitis are a clear confirmation of the opinion advanced by Leber and Rouget, according to whom Schlemm's canal presents a venous plexus.

ANTERIOR CHAMBER.

By the advancement of the iris, the swelling of the crystalline, and the pressure exerted by the exudation behind the lens, the anterior chamber presents a diminution in the first periods of iridocyclitis. It may be reduced to a thin and linear slit (Brehmer) or even be entirely obliterated (Pagenstecher and Genth).

The contents of the anterior chamber consists of an albuminoid liquid, in which are found pus cells or red blood corpuscles; besides, this liquid contains endothelial cells, pigment granules and giant cells which seem to develop through the absorption of the red blood cor-

puscles by the lymph cells. Bizzozero (*Wiener medicinische Jahrb.*, 1872) has found such cells in the pus of hypopion and has declared that these giant cells contain both forms of blood corpuscles and that they play a certain rôle in the resorption of the exudate.

Later in the disease the anterior chamber enlarges, but this increase is greatest in the sagittal direction. In an atrophied bulbus the contents is an albuminoid liquid, a proof that the permeability of the vascular walls for albumen is increased.

Berger has observed some cases of atrophied eyeballs where the anterior chamber had been maintained by hemorrhages.

The presence of fat in the anterior chamber will be considered elsewhere.

FONTANA'S SPACES.

Obstruction of the anterior chamber.—In the beginning of iridocyclitis the periphery of the iris is completely pushed forward against the posterior surface of Descemet's membrane. The spaces traversed by the pectinate ligament of the iris are found filled with pus cells. The endothelial covering of this ligament, as well as the lines which limit these cells, appears in clear outline. Some of the cells contain pigment. When a restoration of Fontana's spaces results, these cells are deeply pigmented at a late period.

Trabeculæ of the pectinate ligament of the iris.—In normal anatomy the pectinate ligament of the iris is described as composed of large trabeculæ. Berger's descriptions of iridocyclitis present these trabeculæ as being split longitudinally. Within these trabeculæ appear small elliptical fenestræ. Such alterations seem to prove that the trabeculæ of the pectinate ligament of the iris are composed of extremely fine fibrillæ, adherent in larger bundles through the intervention of a cement substance which is destroyed by the chemical action of the fluid of the anterior chamber.

In the normal condition this cement substance has the same index of refraction as the fibrillæ, so that the trabec-

ulæ appear homogeneous. The fine intervascular fissures are without doubt the consequence of the swelling. Berger has observed these fissures in only one case.

The same authority, in experiments on sections of animal eyes macerated in a solution of hypermanganate of potash, has found that the trabeculæ of the pectinate ligament of the iris are composed of very fine fibrillæ. In some animals these trabeculæ appear fissured, without previous maceration. This corresponds with sections prepared from the ox by Schwalbe and by Koenigstein.

Separation of the periphery of the anterior chamber.—In a

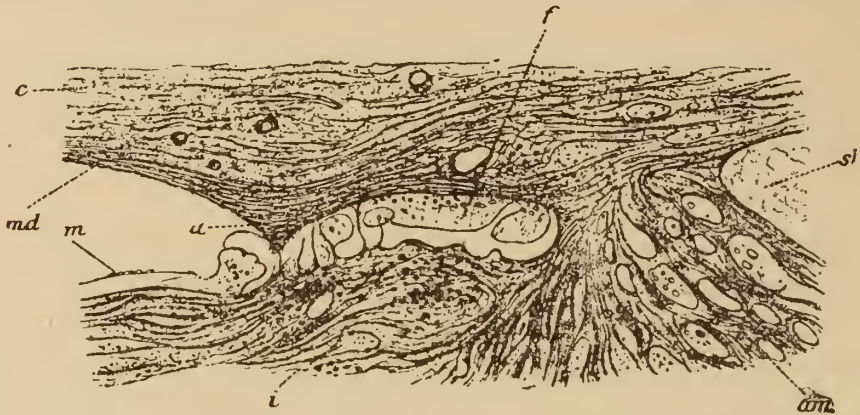


FIG. 10.—Meridional section of the peripheral portion of the anterior chamber from a case of iridocyclitis. Magnified 190/1.

m. Newly formed membrane on the anterior surface of the iris.

f. Separation of a peripheral part of the anterior chamber filled with albuminoid fluid.

a. Splitting of Descemet's membrane into lamellæ caused by the retraction of the iris.

preparation from Berger (Figs. 10 and 11) will be seen a remarkable section, presenting the peripheral portion (*f*) of the anterior chamber closed by a thin, anhistic membrane (*m*). The fissure, which appears longitudinal in transverse section, is filled with an albuminoid liquid containing pus cells and pigmented cells; it does not correspond to Fontana's space. While the iris was pushed forward on Descemet's membrane, adhesions were formed and subsequent retraction of the iris has left this fissure. The extremely fine anhistic membrane which closes the periphery of the anterior chamber in this case, is continuous in front

with Descemet's membrane; posteriorly it covers the anterior surface of the iris. Berger considers it a production from the endothelium of the anterior chamber.

Growth of Descemet's membrane.—It is supposed that Descemet's membrane is produced by the secretion of the cells just mentioned. The increase in thickness of this membrane during the growth of the individual proves that the cuticular secretion of the endothelium continues during extra-uterine life. In man, this increase in thickness is notable. Müller found that Descemet's membrane had at birth a thickness of .005 to .007 mm. at its border, in the adult .015 to .02 mm. at the border to .006 to .008 at the

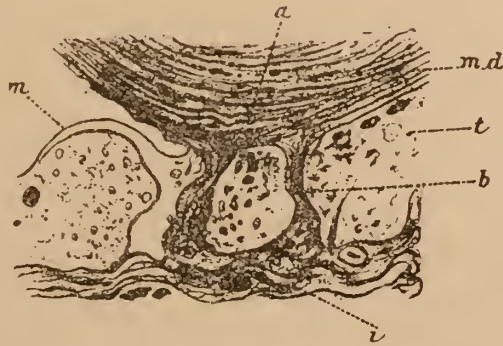


FIG. 11.—The internal edge of the part separated from the anterior chamber.

af, m, as in Figure 10.

center. Still more notable is the growth of Descemet's membrane in animals. In the calf, Berger found its thickness to be at the periphery .01 mm., at the center .012 mm.; in the ox, at the periphery .09 mm., at the center .07 mm. This is proof that Descemet's membrane has a considerable increase in development after birth.

Neoplastic membranes on the surface of the iris.—The preparation (Figs. 10 and 11) just cited presents a demonstration of the growth of a new membrane sometimes to be observed on the anterior surface of the iris. Michel and Becker, who have demonstrated the presence of endothelium on this anhistic membrane, regard it as a neoplastic production.

Oeller believes this membrane to be produced by an

intercellular substance, either homogeneous or fibrillar, or by fusiform cells. Donders and Müller have considered this membrane to be a true vitreous membrane; according to Arlt it is produced by the degeneration of the endothelium of the iris. Berger, who has often seen such membranes in iridocyclitis, is of the same opinion as Fuchs. He considers the membrane as an albuminous deposit from the aqueous humor of the anterior chamber. The membrane covers the connective tissue in the angle of the iris, covers the pigmented layers of the iris to its posterior duplication and even covers the pupillary opening. In all these parts no endothelium exists.

THE IRIS.

We now approach the description of the pathology of those parts that are particularly involved in the early stages of iridocyclitis, namely, the iris, the ciliary body, and the choroid, and here there is especial need for minute attention to the anatomical changes. Berger's sections are particularly clear on these points. We deal first with the iris:

Infiltration. Alterations of the endothelium.—In the early period of iridocyclitis, the iris is already infiltrated by many pus cells, which are chiefly found collected around the blood vessels. The stroma cells do not present any alteration. On the anterior surface of the iris is observed a homogeneous deposit of albumen beneath the endothelium of the iris, which already appears detached in some portions. The endothelial cells contain some pigment granules, which, without doubt, have their origin in the iris. Michel has found extravasations of blood in the endothelium. Hyaline thickening and proliferation of the nuclei have also been observed in the endothelium.

Exudation on the surface of the iris.—In the more advanced periods of iridocyclitis, a fibrino-purulent layer covers the anterior surface of the iris. This exudation may recur several times. In one case of iridocyclitis Berger observed two clearly distinct layers, the upper layer alone presenting an advanced decomposition into granulations, a proof that the two layers were formed at different dates.

The exudation at the anterior surface of the iris may also be destroyed by fatty degeneration, and the anterior chamber may contain globules of fat.

In the late stages of iridocyclitis, the anterior surface is covered by a layer of connective tissue, which in the atrophied eyeball may obstruct the whole of the anterior chamber and present a lamellar structure resembling that of the cornea (Alt).

In both iridocyclitis and in atrophied eyeballs, the fibrous tissue is covered by endothelium, which is detached in some points by a sero-purulent or a serous liquid.

The situation of the *sphincter muscle* of the iris is found changed in the late stages of iridocyclitis; at the same time its posterior surface is turned forward. Michel proposes to term this change an "*ectropion of the sphincter*."

In atrophied eyeballs, after iridocyclitis, the sphincter muscle can still be recognized, but the fasciculi of its fibers are dispersed. Besides, radial splitting of the fasciculi, augmentation of the nuclei of the muscular fibers may be observed. Berger found, in an atrophied eye, lime salts, in the form of very small granules, situated between the fibers of the sphincter muscle.

The *pupil* is frequently closed, either by granulations from the posterior part of the iris, or the iris itself is so swollen that its tissue occupies the place of the pupil (Brehmer).

The iris of atrophied eyeballs.—The stroma cells may also be found proliferated in the iris of atrophied eyes, or the iris may be transformed into a fibrous structure, the posterior part of which is most strongly pigmented. The plexus of cells may disappear entirely, or it may remain between the fibrous trabeculæ (Michel). In such cases it is often impossible to determine the limit between the iris and the deposit which covers it. Later, in the incarceration of the iris in the cornea, it is also impossible to distinguish the limit between the two parts.

In atrophied eyes the iris is considerably swollen, or it presents as a very thin membrane which covers the anterior

capsule (Fig. 12). Very frequently, in atrophied eyeballs, there are found portions of the iris which are infiltrated by pus cells. It is especially in atrophied eyes that the inflammation persists in the uveal tract. Sometimes these inflammatory collections cause a perforation of the stratum pig-



FIG. 12. Beginning of ossification in a fibrous cataract of an atrophied bulbus.

- a.* Calcified fibrous periphery.
- b.* Fibrous masses without calcification.
- f.* Cavity containing ramifying vessels.
- kn.* Artificial fissure produced by the preparation.
- k.* Ossification of the fibrous cataract.
- mr.* Medullary cavity of the bone.
- e.* Cysts produced by the mucoid softening of the posterior part of the fibrous cataract.
- d.* Irregular cavities produced by the mucoid degeneration of the cyclitic exudation.

mentosum, as observed by Berger in an atrophied eye after iridocyclitis, but this has never been described by other authorities.

Posterior layers of the iris.—Michel describes the alterations of the posterior layers of the iris in the following

manner: "The stratum pigmentosum proliferates enormously; the posterior elastic layer is thickened or covered on its external surface by many epitheloid elements, or by neoplastic connective tissue. The latter tissue may also develop between the elastic membrane and the stratum pigmentosum."

In iridocyclitis, symptoms of the proliferation in the pigmented layer appear early. Some of the cells present an augmentation of their nuclei. During the process of proliferation, some of the cells lose a part of their pigment, in such a manner that the edge of the protoplasm appears almost without pigment. In some of these pigmented cells are observed signs of necrobiosis; the nucleus is no longer well limited, or it disappears altogether. In atrophied eyeballs after panophthalmitis, the iris consists of only a fibrous coat, which, in its posterior part, contains numerous pigmented cells and pigment granules.

Neoplastic development and degeneration of blood vessels.—In the first periods of iridocyclitis there is also found a new growth of vessels in the iris. According to Berger, they develop, from the posterior surface of the iris, as solid prolongations of capillary vessels in cylindrical form surrounded by pigmented cells. The alterations of the vessels of the iris consist in a thickening of the inner coat, resulting in closure of the caliber. There is also an increase of connective tissue, chiefly of the external membrane. Thus, the walls of the vessels appear enlarged, and may present as projections from the anterior surface of the iris.

In the vascular wall Berger has noted fusiform cells, lymph cells, and pigment granules, the latter being also present in the interior of the vessels.

Ulrich has found similar alterations in chronic inflammatory glaucoma. At the same time he has found a hyaline degeneration of the vascular walls at the pupillary edge. Michel has also observed inflammatory alterations, the collection of lymph cells, in the iris of glaucomatous eyes.

Cysts of the iris.—Berger has twice observed cyst of the iris in atrophied eyeballs. In one case the cyst consisted

of several cavities (Fig. 13). The cyst wall appeared slightly thickened and composed of connective tissue. In both cases the cyst was situated within the tissue of the iris. This author considers these cysts as due to thickening of the lymphatic channels. However, according to De Wecker, cysts of the iris are caused by the inclusion of the iris in a wound of the eye, or by the inversion and folding of the iris which cause a retention of the aqueous humor. Sattler



FIG. 13.—Meridional section of the anterior portion of an atrophied bulbus, in which there was total detachment of the retina and ossification of the vitreous. Magnified 60/1.

w. Old perforation of the cornea.

zf. Incarcerated portion of the vitreous.

hk. Remains of a fissure of the posterior chamber.

ic. Cysts in the parenchyma of the iris.

observed in micrographic examination of these cysts a fibrous wall covered by an endothelium in several layers. Hosch has shown that cysts of the iris are situated in the tissue of the iris itself.

CILIARY BODY.

Alterations of form.—No part of the eye undergoes so many alterations of form in iridocyclitis as the ciliary body. The ciliary processes appear swollen and proliferated.

They are consequently carried forward and inward; a very fine fissure filled with exudation may separate the ciliary processes from the posterior surface of the iris and from the equator of the crystalline. The fibers of the ciliary muscle appear so changed in situation that the circular fibers of Müller are dragged inward and forward. Fuchs calls this "*ectropion of the ciliary muscle*." Later, cicatricial retraction of the coats surrounding the crystalline cause changes in the form of the ciliary body.

The posterior part of the ciliary body is drawn farther forward and inward. In consequence of this the ciliary body appears folded at an angle (*vide* Fig. 1, p. 316, vol. iii). Even in atrophy of the bulbus the ciliary body may still be recognized, as the stratum pigmentosum and the pars ciliaris retinæ are always preserved. If the organs situated within the eye are lost in part, the ciliary processes may approach by cicatricial retraction until they nearly touch, while at the same time the sub-choroidal cavity is enlarged and filled with exudation.

Proliferation of the pars ciliaris retinæ, inflammatory œdema.—According to Berger it appears that the first alterations which, in iridocyclitis, attack the cells of the pars ciliaris retinæ are not known. This is probably because eyes are rarely enucleated in the beginning of the disease. The first changes begin near the ora serrata in the orbiculus ciliaris. Later they appear in the ciliary processes. The first alterations found by Berger were the appearance of small drops of serum on the external side of the cylindrical cells (Fig. 14). Subsequently small cavities are found between the cylindrical cells and the transverse fibers (*f*) which correspond to Müller's fibers in the retina. There is also observed a small detachment of the internal limiting membrane. Sometimes small cysts develop from this.

If the fluid collects in the pars ciliaris retinæ, the internal limiting membrane is detached in the form of rings. Outside the cylindrical cells are observed vacuoles and small pigment granules which are suspended in the exudate. Lymph cells are found in part between the cylindrical

cells, in part between these cells, and the vitreous lamina.

At the same time alterations occur in the stratum pigmentosum. Berger states that the cells of this structure increase in thickness, and their contour is sometimes dented (Fig. 14). The pigmented cells lose their pigment. In particular it is the portion situated near the vitreous which first appears without pigment; the pigment is preserved the longest at the external surface of the cells. In fact, this is due to the pigment granules which were formerly

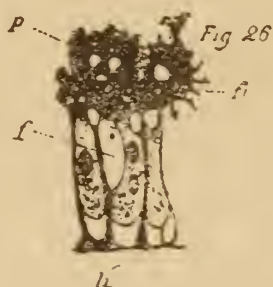


FIG. 14.—The cells of the pars ciliaris retinae of a cyclitic eye in the beginning of the disease.

f. Fluid between the cells and the sustaining fibers.

fr. Drops of liquid on the ciliary part of the retina.

p. Pigmented cells.

li. Detached lamina vitrea.

situated in the pigmented cells, and are subsequently found in the pars ciliaris retinae.

The pigment changes commence, as in the pars ciliaris retinae, in the summits of the ciliary processes. Berger gives an illustration (Fig. 15) that clearly presents the pigment layer already changed by proliferation in the apex of each ciliary process, while with a low magnifying power it is impossible to note any alteration in the depressions between the processes of the same part.

The changes in the cylindrical cells are diverse. They may increase as a whole and form tubular agglomerations similar to glands. Their development is greatest over the flat portion of the ciliary body.

The cylindrical cells may also become transformed into fusiform cells, which are directed inward and forward paral-

lel to the external surface of the zonule. Among them may be seen pigmented cells and pus cells.

Brailey has described changes in glaucomatous eyes that are similar to those found in iridocyclitis. That is, small cystoid fissures containing pus cells. The proliferations of the cells of the pars ciliaris retinæ also resemble senile changes.

Cuticular secretions from the pars ciliaris retinæ.—It is believed by Berger that the lamina vitrea of the vitreous



FIG. 15.—Vertical section in the direction of the ciliary processes in their anterior portion. Magnified 130/1.

ihk. Prolongation of the posterior chamber filled by sero-purulent exudation.

z. Principal mass of the zonular fibers covered with pigmented cells.

humor is the result of proliferation of the pars ciliaris retinæ. Apparently there can exist no doubt that the neoplastic cells of this layer preserve the same qualities as the cells that gave them origin, and which produce cuticular secretions. Thus this author regards the vitreous lamina as a cuticular production from the cylindrical cells.

Fig. 16 represents the pars ciliaris retinæ as extremely thick, in the orbiculus ciliaris of an atrophied eyeball. In the anterior part of the preparation, the cells are filled with fat globules. In part of the region which is shown the

cells are totally destroyed by fatty degeneration. There only remains a confused mass with intervals corresponding to the size of the cells. An elastic membrane covers this portion. The only explanation appears to be in the production of cells ulteriorly destroyed by fatty degeneration.

Neoplastic vessels.—From the proliferating cellular layer of the pars ciliaris retinæ prolongations of cylindrical form, surrounded by pigmented cells, penetrate into the contiguous tunics of the crystalline and there form a plexus with

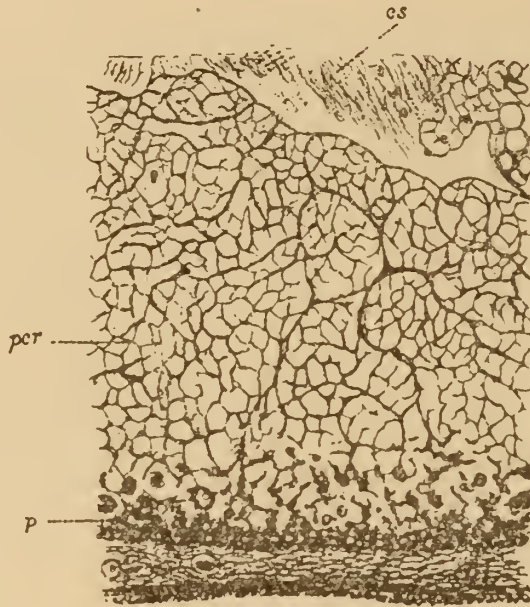


FIG. 16.—Meridional section of the pars ciliaris retinæ of an atrophied bulbus, showing great thickening. Magnified 130/1.

p. Proliferation of the stratum pigmentosum.

per. Destruction of the cells by fatty degeneration.

close meshes. Berger has observed vacuoles in some of these prolongations. In others, transverse section shows long cavities containing some red blood corpuscles. Schiess-Gemuseus appears to have been the first to declare these prolongations to be the origin of the vessels. However, Alt has denied their vascular nature because he failed to inject them.

With regard to the origin of these vessels several authors believe that they are produced by the proliferation of the cells of the pars ciliaris retinæ. According to Haensell, the fusiform cells already noted are developed by the transfor-

mation of the cells of the ciliary part of the retina into a fibrillar connective tissue. Haensell has observed karyokinesis and augmentation of the nuclei of the cylindrical cells. He believes that the nuclei are transformed into fibrillæ by their development, while the protoplasm is consumed by this growth. In the beginning, the cells appear similar to Müller's fibers.

Consequently, we can say that the elements of the ectoderm (the cells of the pars ciliaris retinæ) are capable of transformation into capillaries as well as into fibrous tissue. Berger's researches show that the prolongations of vessels situated in the pars ciliaris retinæ traverse the layer of cylindrical cells and develop from the capillary vessels of the ciliary body. With regard to the fusiform cells the same author believes that their identity with fibrous tissue has not yet been demonstrated by clinical examination.

The blood vessels of the ciliary body are subject to the same changes as in other parts of the eye. They may suffer obliterating inflammation and in the atrophied bulbus may present deposits of lime salts.

Ciliary processes.—The swelling of the ciliary processes in iridocyclitis is caused by the imbibition of serum, by the infiltration of pus cells, and by a very considerable enlargement of the blood vessels, chiefly the veins. Small hemorrhages into the ciliary processes may also occur.

Ciliary muscle.—The fasciculi of the ciliary muscle are separated by the inflammatory œdema. The interstitial fibrous tissue is traversed by the serum and by lymph cells (Figs. 17 and 18.) Consequently, the reticular structure of the ciliary muscle (Iwanoff) is clearly distinguished, and the continuation of the radial muscular fasciculi into the circular is observed. In these preparations, from Berger, longitudinal fissures are seen in the non-striated fibers themselves, such as result from the influence of reagents. According to Engelmann's researches, the protoplasm, both of non-striated and striated fibers is composed of longitudinal fibrillæ, which adhere through the intervention of a cement substance. The chemical alteration of the nutritive fluid pro

duced by the inflammation causes solution of this mastic substance, allowing observation of the primitive fibrillæ.

Thickening of the ciliary muscle due to interstitial œdema has been wrongly described, according to Berger, as an



FIG. 17.—Meridional section of the ciliary body from an eye enucleated for iridocyclitis. Detachment of the vitreous by fluid situated within the zonular fibers. Magnified 200/1.

- a.* Deeply stained reticular portions of the vitreous.
- b.* Similar parts not well colored.
- h.* Cavities of the vitreous.
- l.* Lamellar part of the vitreous.

hypertrophy of this structure in iridocyclitis. However, we have all as authority for the existence of a true hypertrophy of the ciliary muscle in iridocyclitis. In the later stages of iridocyclitis the interstitial œdema of the ciliary

muscle becomes less, but the fibrous masses situated between the muscular fasciculi are greatly proliferated. Only in atrophied eyeballs does Berger find any considerable

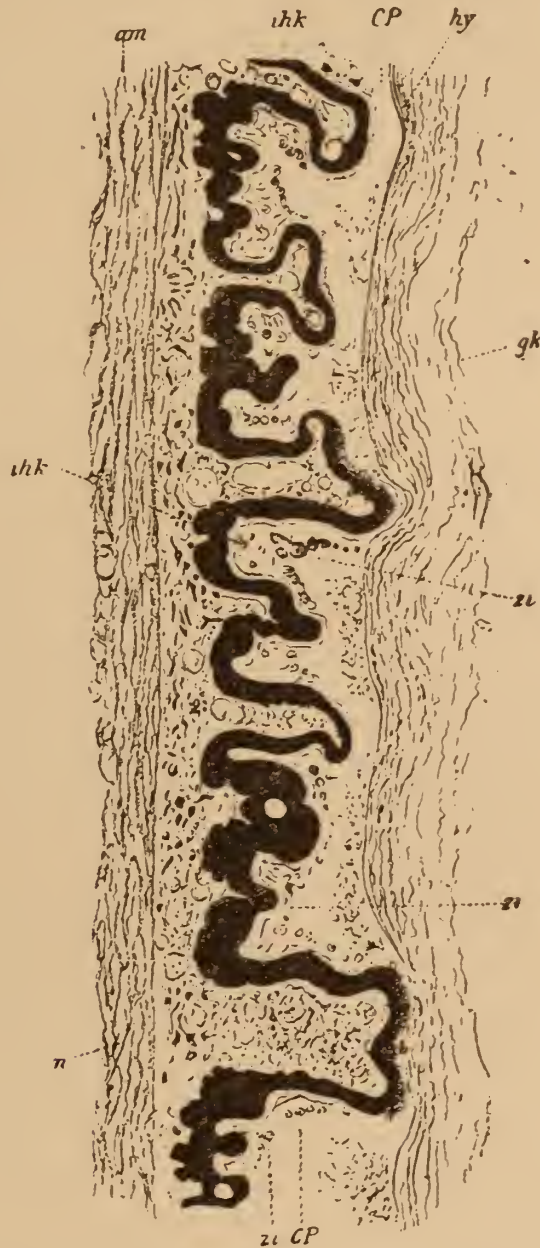


FIG. 18.—Section vertical to the axis of the ciliary processes nearly in the center of the bulbus.

augmentation of the nuclei of the ciliary muscle. In some muscular fibers this author has observed division of the protoplasm by fine transverse lines.

The very feeble reaction of the non-striated muscles to inflammatory irritations has long been known to patholo-

gists. Even in the case of prolapsus of the ciliary body into a wound of the cornea, that was cited above (*vide* Fig. 1, p. 316, vol. iii), the ciliary muscle presents no histological alteration, except where hemorrhages in some portions have destroyed the muscular fibers. Inflammatory proliferation of non-striated muscles has been observed around carcinoma by Gussenbauer. In panophthalmia the muscular fibers are separated by masses of pus (Wedl and Bock).

The ciliary muscle may also undergo a regressive metamorphosis caused by the inflammatory process. The nuclei appear indistinct and the protoplasm becomes opaque from the presence of small granules. Subsequently small fat globules are observed within the protoplasm. Finally the ciliary muscle with its nerves and its vessels is destroyed by atrophy.

Wedl and Bock have observed small colloid corpuscles which covered the atrophied muscular fibers.

In an atrophied bulbus after panophthalmia the ciliary muscle is generally found transformed into a fibrous mass, in which appear radiating fissures similar to those observed in the normal condition.

Infiltration, hemorrhages in atrophied eyeballs.—Berger has frequently found inflammatory changes in the ciliary body of eyes enucleated on account of sympathetic ophthalmia. Sometimes the iris, the ciliary body, the cyclitic coats and the subchoroidal space are simultaneously transformed into an inflammatory focus, in which the original tissues cannot be recognized. Gayet and Masson describe differences that may be shown by the ciliary muscle in various parts of the same eye, but their description of a normal condition of this muscle in some portions of an atrophied bulbus does not accord with Berger's researches.

Deposits of lime salts are very frequent in the ciliary body of atrophied eyeballs. But the formation of true osseous tissue in the ciliary body is denied by Müller. In the two cases of ossification of the ciliary body that have been

reported (Lundy,* G. W. Smith †), it is probable that there was ossification of a deeply pigmented cyclitic exudation.

In the same way Berger doubts the existence of a true ossification of the iris. The case described by Berthold, as ossification of the iris, relates without doubt to the formation of osseous tissue in a neoplastic membrane resulting from cyclitic exudation. The same seems true of a case published by Panas, in which there was great difficulty in performing an iridectomy on an atrophied bulbus. The section removed presented true osseous tissue.

Sarcoma of the ciliary body, in atrophy of the bulbus will find place with that of the choroid.

CHOROID.

Exudation into the internal layers.—In iridocyclitis the first changes of the choroid chiefly affect the inner layers, that is, the choriocapillaris and Sattler's elastic pigment membrane which is perforated by the arterioles and the small veins of the choriocapillaris. The inflammatory changes in the beginning of panophthalmitis are the same, except that in this disease is found a subsequent considerable imbibition of the fibrino-purulent exudate in the external layers of the choroid. In syphilitic choroiditis, Fuchs has shown that the external layers of the choroid are especially affected. In glaucoma, Sattler has found inflammatory changes in the inner layers and in the vitreous body.

According to Berger, in iridocyclitis, the vascular plexus of the choriocapillaris are thickened and surrounded by lymphatic cells. Thus we observe exudation into the perivascular lymph spaces of the choroid. This may be transformed into a fibrous tissue, with the production of adhesions that prevent detachment of the retina at these points. The elastic lamina is thickened and fissured parallel to the surface of the choroid.

* *New York Med. Rev.*, 1880. In this case the crystalline was surrounded by ossification (as in a case reported by Goldzieher).

† *Amer. Jour. of Ophthal.*, 1, No. 8, p. 254.

While these changes develop in the internal layers, some portions of the pigmented layer (stratum pigmentosum) are found separated from the elastic membrane by the transudation of a homogeneous liquid.

The elastic lamina is found preserved in iridocyclitis even to the end of the disease, but it always appears much thickened (Müller). According to the researches of Schiess-Gemuseus, it is much more destroyed in panophthalmia. In panophthalmia the choriocapillaris appears soaked with pus.

Proliferation of the stroma cells.—The pigmented and non-pigmented cells of the stroma of the choroid are not changed in the early stage of iridocyclitis. It is only in well advanced cases and particularly in atrophied eyeballs that we are struck with the swelling of the protoplasm and by the augmentation of these cells. Some of the pigmented cells lose a part of their pigment. According to Gayet and Masson, the stroma cells have a tendency to atrophy, which is not diffuse but appears in foci. The late occurrence of the proliferation of the stroma cells in iridocyclitis is a proof that they do not produce the lymph cells by proliferation as believed by Ritter and Schiess.

External layers.—The changes in the layers of large vessels are very marked in the beginning of iridocyclitis. Sometimes a true œdema of the choroid is found. For example, Berger has seen, in a case of advanced iridocyclitis, the posterior portion of the choroid swollen to the thickness of a millimeter. The size of the vessels was very little changed except that some were enlarged. Schiess-Gemuseus has also mentioned slight œdema of the choroid in the beginning of atrophy of the ocular globe.

Later, a portion of the large vessels is attacked by obliterating endarteritis, during which a development of pigment within the vessels occurs. In iridocyclitis as well as in panophthalmitis, a tendency to cicatricial degeneration of the choroid is especially manifest. This degeneration has been termed "hyperplastic fibroid." Berger finds this change most developed in eyes that atrophy after panophthalmia.

Here the choroid is constituted by lobular coats, which are very extensive and formed by connective tissue containing pigmented cells or irregular masses of pigment.

In the connective tissue are observed branched fasciculi parallel to the surface of the choroid. These fasciculi contain amorphous pigment and fat globules. In other parts of the same eye Berger found the large vessels of the choroid well preserved, although the bulbus was atrophied as the result of panophthalmitis. Yet the quantity of blood in the choroidal vessels was much diminished in all cases, for the venæ vorticosæ sometimes appeared so much contracted that their caliber differed markedly from that of the sclerotic canal that they pass through.

A case of atrophy of the bulbus, described by Schiess-Gemuseus, proves that the transformation of the choroid into fibrous tissue may develop in an irregular manner. The choroid appeared normal in its anterior portion, while the posterior part was changed into a fibrous tunic of three millimeters thickness.

Inflammation of the choroid in atrophy of the bulbus is a very frequent occurrence. A few years ago Deutschmann pointed out the importance of the inflammatory infiltration of the posterior portion of the choroid. This inflammation may develop to such an extent as to leave the choroidal tissue no longer recognizable. Hirschberg appears to have been the first to observe this inflammation in a bulbus enucleated on account of sympathetic ophthalmia.

In one case Berger found a neoplastic development of fibrous excrescences in the posterior part of the choroid of an atrophied bulbus. These excrescences developed from the internal surface of the choroid and penetrated into the sub-retinal space. They were formed by a connective tissue containing vessels which developed from the choroid. An elastic lamina covered the excrescences. Pigmented cells and colloid corpuscles were found on the vitreous lamina. Wedl and Bock believe that these excrescences develop from the choriocapillaris.

Deposits of lime salts in the choroid of atrophied eyeballs

are quite frequent. In one case Berger found a very large portion of the choroid in a calcareous condition, with a small deposit of true osseous tissue near the optic nerve.

Ossification of the choroid.—The choroid is almost exclusively the part in which we observe an ossification of the inflammatory products that result from previous inflammations of the eyeball. At the present date we have an immense fund of information from which can be drawn positive data relating to this subject, but a review of this literature must be confined to very recent researches, for the reports of the older authors on the presence of ossification of the choroid, are extremely apocryphal, from the fact that they did not distinguish well between calcification and ossification. Thus Voigtel (1809), Otto (1813), Meckel (1812), Schoen (1828), and others before them are doubtful authorities. Sichel, in 1846, characterized the reaction against dubious reports of the occurrence of osseous tissue in the eyeball by saying that deposits of calcareous salts existed only in the crystalline, in its capsule, in the vitreous and in the retina, and that true ossification was not to be found in the eye. Subsequently, in 1847, Arlt stated that cases in which ossification of the choroid was described, were only cases of calcification of an exudation situated between the choroid and retina, which detached the vitreous and finally produced a partial resorption of the vitreous. Meyer also denied the existence of ossification in the choroid, but believed its presence in the crystalline and vitreous to be possible.

Hulke was the first to demonstrate the presence of true ossification of the choroid, but, like many other new facts, no attention was given to his communication, and Förster appears to be the initial observer that has given us an illustrated report of the deposit of true bone in the choroid. To Pagenstecher (1860), however, we owe a very exact knowledge of this subject. According to Pagenstecher's researches ossification of the choroid is frequently seen. Deposits of bone in the choroid is also more frequent than in all other parts of the eye taken together. Thus, Berger, in the examination of nineteen atrophied bulbi found ossifi-

cation of the choroid in ten cases and ossification in the inner ciliary layers three times, in fibrous cataract twice, in the retina twice, and twice in the vitreous humor degenerated into a fibrous tissue.

According to Knapp the osseous tissue arises from the



FIG. 19.

internal surface of the choroid. In Alt's opinion it is the most internal layer, the lamina vitrea and its verrucous excrescences, that first becomes the seat of calcaeous collections and finally of a true ossification. This is well illustrated in one of his sections (Fig. 19), representing a calcaeous deposit in a vitreous excrescence of the choroid, with the subsequent production of osseous tissue. Thus there



FIG. 20.—*a*, osseous trabeculae; *b*, interstice filled with fat globules and crystals of cholesterol and margaric acid; *c*, choroidal pigment partly affected by fatty degeneration.

develops an osseous growth which gradually extends forward. This osseous tissue is composed of trabeculae of bone as shown by Fig. 20, from Haase.

According to Pagenstecher, Panas, and Goldzieher, an exudation into the choroid represents the first step; this is transformed into fibrous tissue, and then into an osseous

structure. Hoene has also found that the osseous tissue develops from neoplastic, embryonic connective tissue, while the primitive tissue of the choroid is destroyed. According to Schiess the ossification develops in the elastic lamina. Osseous tissue situated between the elastic lamina and the retina is also described by Brailey and Lobo. Knapp's opinion has already been given, but it is necessary to add his belief that the choriocapillaris, with its rich plexus of blood vessels, furnishes the material essential to the formation of osseous masses.

In cases in which Berger has observed a commencement of ossification, the lamina elastica of the choroid was preserved and covered the internal surface of the osseous mass. The layers of the choroid outside the ossification presented an increase of connective tissue cells and pigmented cells. In cases where the ossification was found between the elastic lamina and the retina, the exudation placed at the inner surface of the choriocapillaris had probably produced a rupture of the inner choroidal layer, in consequence of which the exudation spread between the retina and the choroid, with subsequent change into fibrous tissue. This fibrous tissue is formed by vessels which develop from the choroid. Later, its final change into osseous tissue takes place.

We have already cited Knapp as believing in the choriocapillaris as a source of nutrition for the osseous development. Pagenstecher is of the same opinion, but also admits that nutrition by the central artery of the retina is possible. According to Berger it is beyond doubt that the arterial branches which develop from the lamina cribrosa are in relation with the nutrition of the ossification of the choroid, but not that there also exist other branches of the central artery for this purpose.

Klebs and Knapp state that the ossification may develop simultaneously in several parts, and Berger found three entirely separate pieces of bone in a preparation from the surface of the choroid of an atrophied bulbus.

If the ossification be well developed, the usual histological structure of bone will be found. The preparation

will present the bone tissue constituted by the regular, concentric Haversian lamellæ and the Haversian canals. In Berger's preparations, the well marked lines, the lacunæ of Howship, and the necrobiosis of the bone cells, which is manifested by a granular opacity that may be observed in the neoplastic osseous tissue, prove that the newly formed bone is attacked by the same alterations and by resorption as the physiological bone.

In very extensive ossifications of choroid, the commencement of a development of medullary spaces is observed. These spaces contain fat globules, pigment granules, pigmented stellate cells, and crystals of margarín (Wedl and Bock). With a more advanced growth of bone, the medullary spaces appear enlarged, and the mass changes into a spongy osseous tissue.

In proportion as the osseous mass acquires development, the vitreous lamina disappears and thus may develop a bony cup that extends to the crystalline. This cup is covered on its inner side by a thin framework of cellular tissue, the remains of the atrophied retina.

Ossification may also develop in malignant neoplasms, as in a case related by Alt (Fig. 21). Here should be noted the previous change of such tumors into hyaline cartilage.

SARCOMA OF THE UVEAL TRACT OF ATROPHIED EYE-BALLS.

In view of the extreme rarity of cases in which sarcoma has been reported as developed in an atrophied bulbus, with subsequent danger of sympathetic ophthalmia, there will be considerable interest in a review of two cases observed by Berger.

In one case, a giant-celled sarcoma, only pigmented in some parts, occupied the middle part of the ciliary body, and extended into the subchoroidal space. In some parts the non-striated fibers of the ciliary muscle were destroyed, and replaced by the neoplasm. Rows of cells extended between the muscular fasciculi into the limit of the neoplasm. Externally the tumor had penetrated in several points

through the pigmented layer of the ciliary body. Here some sarcoma cells contained pigment granules. The small vessels and the capillaries which pass from the ciliary body into the inner ciliary layers were alone preserved. The neoplasm extended slightly into the inner layers, the cells of the pars ciliaris retinæ being no longer recognizable. In the vicinity of the tumor were found irregular spaces filled with a fluid containing a few lymph cells.

External to the inner ciliary layers, the fine trabeculæ which separate the sarcoma cells were easily recognized,

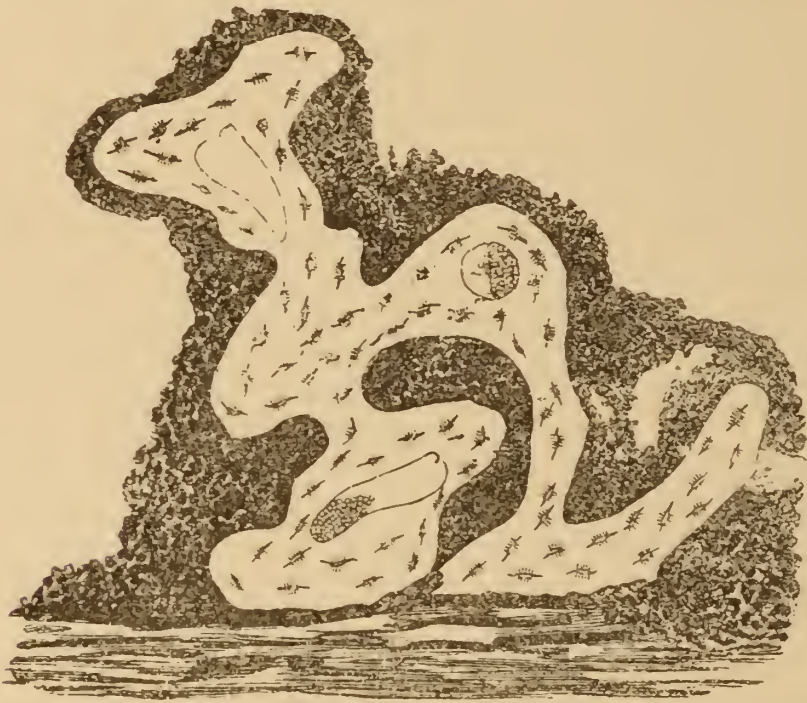


FIG. 21.—Formation of osseous masses in a sarcoma of the choroid.

while the small spaces between the trabeculæ were filled by a homogeneous mass produced by the hyaline transformation of these cells (Schleich, Fuchs).

Near the tumor were observed very extensive deposits of lime salts in the ciliary muscle and in the inner ciliary layers. Cells of pus were also found, as around tumors in general.

The lenticular capsule and the peripheral portion of the cataractous lens were calcified (Figs. 11 and 12).

In Berger's second case, the tumor consisted of pigmented fusiform cells. It extended to nearly the whole of the choroid and forward into the ciliary body and iris as well as in the subchoroidal space. This space was filled with a fibrous tissue containing cystoid cavities. The *ciliary nerves* were destroyed in several parts by the tumor. The cornea and the anterior part of the sclerotic were not attacked by the tumor, but were found traversed by lymph cells. Posteriorly, the tumor extended into the sclerotic, but this structure was not perforated in any part. From the choroid, the tumor invaded the optic nerve and retina.

This case is of especial interest from the presence of the marked effect on the ciliary nerves and because of the removal of the eye on account of a beginning sympathetic ophthalmia in the fellow organ. Later on, the changes produced in the ciliary nerves of atrophied eyeballs will be given *in extenso*.

(*To be continued.*)

OPHTHALMOLOGICAL NOTES.

Schweizer has studied, at his clinic in Zurich, the conditions which favor the evolution of choroidal lesions, and particularly of the macula. First, he has noted that in an average myopia of 3 dioptrics, the danger of lesions of the macula depends much upon the nature of the myopia; congenital hereditary myopia predisposes to these lesions less than acquired myopia.

Vitreous disturbances among myopes scarcely ever appear if the myopia is below 3.D. Above this figure, and in the medium degrees, these troubles are observed in more than 3 per cent. of cases, but they become much more frequent when the myopia attains 9.D.; then the development of affections of the vitreous is connected with lesions of the macula.

Detachment of the retina, of a general proportion of 0.7 per cent. in myopes, is much more frequent if sought only in a myopia of 10. D. and upward; then it gives a proportion of 5 per cent. This accident, according to Schweizer's statistics, does not appear more frequently in advanced age, as has been said, than in the middle age of life.

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Schneller ("Beiträge zur theorie des Schielens auf grund pathologisch-anatomischer Untersuchungen." Congress of Berlin, 1890), insists that there are three factors which regulate the position of the eyes: 1. The innervation of the muscles. 2. The anatomical condition of the ocular

muscles. 3. The obstacles opposed to the movements of the eyes. The state of the muscles plays the most important part. By numerous anatomo-pathological researches, Schneller has found that in convergent strabismus the external recti, in divergent strabismus the internal recti, are very often much narrower and thinner than in a normal state. This would certainly cause a tendency to strabismus, and the deviation would occur more easily if there existed at the same time an anomaly of refraction or of accommodation.

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Scheffels has collected forty-one detailed observations of resection of the optic nerve (*Klin. Monat. f. Augenheilkunde*). The clinical facts he deduces are the following: Resection has been followed by absolutely excellent results in fifteen cases when the patients suffered directly and exclusively from the operated eye (recurring irritative and inflammatory states with severe pain and annoying photopsias). In seven of these fifteen cases the existing sympathetic irritation disappeared. Resection was made in twenty-six cases where sympathetic inflammation of the other eye was feared.

A resection will be free from all criticism when the two following conditions are observed: 1. The nerve and the sub- and supra-vaginal space should be interrupted in a permanent manner. Schweigger demands a resection of 10 cm. The author believes that several millimeters less will be sufficient.

2. This interruption should be made early, before the virus of sympathetic ophthalmia begins its propagation. How much time may be allowed to pass? The author cites periods of time elapsing between the traumatism and the sympathetic accidents, varying from four days to thirty-five years. Sixteen cases are known in which the disease has appeared from one to thirty-five days after enucleation before there existed any sympathetic symptoms. The second question is very difficult to decide; it will be resolved in a variable manner with individual judgment. Resection will

only be resorted to for eyes that are positively lost, or where the symptoms permit us to consider them as certain to be destroyed.

In a practical point of view, this extensive work of Scheffels carries the two following conclusions:

1. In all cases where the patient suffers exclusively from a blind eye, and in cases where sympathetic irritation exists, if there be a sympathetic neurosis of the other eye, without danger of a veritable sympathetic inflammation, enucleation should be replaced by resection.

2. In all cases where sympathetic ophthalmia is to be feared,—comprising cases when a foreign body is found in the eye,—many of our colleagues undertake prophylactic resection, first as a substitute for enucleation, in the second place to clear up the question of the mode of conduction of sympathetic ophthalmia. It is the only means which permits a solution of this question. If, in spite of resection, a sympathetic ophthalmia appears the case should immediately be published.

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G. Cirincione (*Giorn. di Neuropatologia*) presents a very interesting study of xerosis of the epithelial form. His observations include bacteriological experiments and pathological examinations.

Five series of cultures were made: 1. Cultures with the material removed from the conjunctival cul-de-sac. 2. Cultures with the same material in a more advanced stage, when suppuration of the bulbus was imminent. 3. Cultures with the blood. 4. Cultures with small bits of xerosed conjunctiva, removed some minutes after the death of the patient. 5. Cultures with material taken from the spleen.

Cultures made with the material removed from the conjunctival cul-de-sac, during the stage when the xerosis was not complicated by corneal symptoms, have positively demonstrated the presence of the bacillus of xerosis; while cultures made when the cornea was fully involved have demonstrated, with the bacillus, the presence of the staphy-

lococcus pyogenus aureus. Cultures with material taken from the nasal mucosa of a patient affected by ozæna also demonstrated the bacillus. Cultures with material from the blood and from the spleen, on the contrary, gave negative results.

Experiments with these cultures gave the following results: 1. Inoculations of the culture of the bacillus of xerosis, made in the conjunctival sac, in the anterior chamber, and under the conjunctiva, have been negative, even in animals subject to bad general conditions. 2. Inoculations of the pure culture of the bacillus in the blood and in the peritoneal and pleural cavities have also given a negative result. 3. Inoculations with material taken from dead animals, or those killed after inoculation with a pure culture of the bacillus, have remained sterile. 4. The transplantation of a small section of xerosed conjunctiva has caused, in one animal, necrosis of the cornea and, in another, a circumscribed opacity of the corneal epithelium.

These results, analogous to those obtained by Fränkel and Franke, united with the observations of Schleich, Schreiber, and Fick, who have found the bacillus in different diseases of the conjunctiva, even in the normal membrane, demonstrate that the bacillus discovered by Raymond and Colomiatti does not possess the least pathogenetic power on the conjunctiva.

In the nervous system, on the contrary, the author has found lesions which should have a certain weight in the explanation of the clinical form of xerosis. These alterations were limited exclusively to the ganglia of the fifth and of the third pair, and consist in a multiplication of the elements of the capsule, and in the nucleoli and in the protoplasm, in part transformed into a white, transparent substance, and into a granular material, evidently of exudative nature, which fills the lymphatic spaces. In brief, there exists a chronic inflammation of the ganglia of the fifth and of the third pair of nerves. The author believes that these

lesions are sufficient to explain the clinical form of xerosis, independently of the action of the bacillus.

Ricke (Von Graefe's *Archiv. für Ophthalmologie*) has examined the pigmented elements of the choroid in different animals. The choroid of the sheep presents clear meridional striæ, the vessels being surrounded by strongly pigmented bands. The pigmented cells are of different forms, having well limited round or oval nuclei. In the supra-choroidal layer, pigmented cells of epitheloid forms are found.

The pigmented cells of the choroid of the cow are distinguished by an abundance of pigment granules which often prevent recognition of the nucleus, while the cells of the supra-choroidal layer are poor in pigment. The choroid of the calf differs from that of the adult animal by the presence of a great number of stellate cells. Cells of the same form are often found in the pig, especially in the ciliary region of the choroid. The pigmented cells of the guinea pig, stellate like the preceding, are very rich in dark pigment, though allowing their nuclei to be well seen. In the adult rabbit are found pigmented cells of very varied form, rich in pigment, and possessing clearly visible nuclei, while the new-born rabbit presents fusiform or stellate cells, with nuclei that are seen with difficulty. In the choroid of the young dog free pigment is found aside from the pigmented cells.

The author draws the following conclusions from his study :

1. The pigment is formed exclusively in the cells ;
2. The form of the pigmented cells is not constant. The stellate cells are found especially in the ciliary region ;
3. The pigmented cells are generally disposed along the vessels ;
4. The free pigment should be considered as derived from the ramifications of the cells or as remaining from resorbed cells ;
5. In certain species a pronounced pigmentation is found in the new-born.

With regard to the first appearance of pigmented cells in the human choroid, the author gives his researches made on embryos of four, six, seven, and eight months, and on the new-born. The pigmented cells begin to appear in the supra-choroidal layer during the seventh month of intra-uterine life; two preponderant forms are found then: fusiform cells, with an oval nucleus; and stellate cells, with a round nucleus. Aside from these cells, Ricke has found nuclei without protoplasm, that he considers as a state of development of the pigmented cells. In support of this observation, the author cites an embryo of eight months in which the choroid contained no pigmented cells. At the age of nine months all the pigmented cells have prolongations. They present the character of fixed cells of connective tissue filled by pigment granules. In the new-born the pigment granules become more considerable, the nuclei less visible, producing difficulty in recognizing the shape of the pigmented cells. The pigmentation of the posterior pole is often found more pronounced than that of the other parts of the choroid. The author draws the following conclusions:

1. The first appearance of pigment in the human choroid occurs in the seventh month of intra-uterine life.
2. It is subject to considerable individual variations.
3. The fixed cells of the connective tissue, and not the leucocytes, form the pigment.

With regard to the formation of the pigment, the conclusions of the author are less affirmative. In his opinion the pigment is formed in the pigmented cells by a specific function of these structures. However, the absence of iron in the pigment of the choroid is not sufficient to set aside the possibility of its formation by metamorphosis of the hemoglobin and its immigration into the pigmented cells.

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Evetzki (*Wiestnik. Oph.*) believes that pigmentary retinitis is an eminently chronic affection of the retinal vessels, propagated from the center toward the periphery and producing

not only thickening of their walls, but extending to complete obliteration of their lumen. In consequence of the circulatory disturbance there first occurs an atrophy of the visual and of the pigmented epithelium, the proliferation of the connective tissue being only a secondary phenomenon. With regard to the displacement of the pigment it would be natural to suppose that when it becomes free, in consequence of an atrophy of the cells of the pigmented epithelium, it is attracted by the lymphatic current and deposited in the retina, where, being retained by the vascular plexus, it is massed around the walls of the vessels.

BOOK REVIEWS.

A PRACTICAL TREATISE ON DISEASES OF THE EAR, Including a Sketch of Aural Anatomy and Physiology. By D. B. ST. JOHN ROOSA, M. D., LL. D. Seventh Revised Edition. New York: Wm. Wood & Co. 1891.

The seventh edition of this valuable text-book comes to us as a handsome volume of about 750 pages.

It would be a work of supererogation to attempt to acquaint our readers with the general contents of this work, which has so long been standard with all who are interested in the study and practice of aural surgery. The present edition contains the additions and alterations necessary to bring it up to the present standard of knowledge in this department. Notable in this respect is the portion treating of mastoid disease, which covers some 90 pages, and which considers this important subject in a most thorough manner.

The value of the various operations upon the drumhead and ossicles is carefully discussed, the methods of Sexton and others up to the present time receiving due consideration, but apparently not changing the author's position in opposition to many of these manipulations. In his remarks on the treatment of furuncle, Dr. Roosa introduces the subject of internal medication in diseases of the ear, and in speaking of the use of calcium sulphide, he says : " The question of the value of internal medication is one notoriously hard to solve ; but certain it is, however, that calcium sulphide has not yet obtained a firm hold upon the

profession as a means of aborting or checking suppuration. I have not been able to satisfy myself that we as yet have any specific for aural inflammations of a suppurative character."

In our opinion it is just this searching for a "specific" which is the cause of the skepticism of the author and his school in relation to many valuable remedies. When a drug is reported as curative in a given disease or condition, it is straightway given in every case of such disease or condition without respect to individual symptoms, and of course it fails in the large majority of cases and is soon dropped.

With the homeopath it is not enough to know that a drug has cured a certain pathological condition; he must also know the exact symptoms which accompanied that condition, and which are produced by the drug when proved upon the healthy individual.

Having the pathological condition present, *plus* the individual symptoms of the drug, he is reasonably certain of a favorable result, and to him the word "suppuration" does not mean calcium sulphide unless it be accompanied by the other symptoms produced by the drug; in other words, he prescribes for the individual case, and not for the name of the disease.

In its sphere Dr. Roosa's work is classic, and it is entirely indispensable to every practitioner who desires to keep up with current thought in this department.

It is unnecessary to state that the publishers have performed their whole duty.—D.

ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES. Edited by CHARLES E. SAJOUS, M. D., and seventy associate editors, assisted by over two hundred corresponding editors, collaborators, and correspondents. Illustrated with chromo-lithographs, engravings, and maps. Five volumes. Philadelphia: F. A. Davis. 1891.

The fourth yearly issue of this valuable work is before us and is, if anything, an improvement on its predecessors.

We can hardly over-estimate the usefulness of a work of this character, which concisely states the advances made in all departments of medicine for the year. The physician, be he specialist or general practitioner, who carefully reads these volumes each year, cannot fail to be well posted. The portion in which we are immediately interested, viz., that concerning the eye, ear, and

throat, is to be found in volume iv. Of this, the review of the progress in ophthalmology occupies 156 pages ; that of otology, 48 pages ; diseases of the nose and accessory cavities, 38 ; diseases of pharynx and tonsils, 14 ; diseases of larynx, trachea, and œsophagus, 34 ; intubation, 10, and diseases of the thyroid gland, 12.

A large amount of valuable information is given, the references being accurately indexed, enabling the reader to peruse at his leisure the articles from which the selections are made, if he so elect. The illustrations are profuse and of most excellent workmanship, the department of ophthalmology, in particular, containing a number of chromo-lithographs which are exceedingly fine ; the subjects treated being of rare interest to the specialist.

The work of the publisher has been well done ; the volumes are handsome, the type and paper excellent. The vast amount of labor entailed can only be appreciated by those who are accustomed to searching through the great volume of medical literature for definite information on a given subject, as in the preparation of articles for publication ; to this class the work should prove a great assistance, while it cannot fail to be of much interest to all medical men.—D.

PERSONAL.—Dr. Charles M. Thomas, of Philadelphia, announces that he will hereafter relinquish the practice of general surgery, and will devote his entire attention to the diseases of the eye and ear.

NOTE.

In the July issue, the last paragraph of Dr. French's article, on page 222, was inadvertantly detached and added to Dr. Casseday's paper, on page 224. All that part of Dr. Casseday's article beginning : *Phorometers*, on the bottom of page 224, should properly be placed at the end of the matter on page 222.

THE JOURNAL OF OPHTHALMOLOGY, OTOLOGY AND LARYNGOLOGY.

EDITOR,
CHARLES DEADY, M. D.

ASSOCIATE EDITORS,
H. H. CRIPPEN, M. D.
H. F. IVINS, M. D.

DENTAL REFLEXES AS SHOWN IN THE EYE.

BY F. F. CASSEDAY, M. D., MINNEAPOLIS, MINN.

A very prolific cause of eye diseases exists, in my opinion, in diseased teeth. American literature, strange to say, furnishes very little evidence on the subject, but foreign literature, especially of the last few years, gives some valuable clinical evidence, which throws much light upon this obscure subject. In many cases, apparently, the same diseased conditions of the teeth produce various eye affections, and for this reason a knowledge of the modes of transmission of the irritation is necessary to a complete understanding of a given case. I append some interesting cases, and in conclusion will formulate the effects of dental irritation clinically, and the pathology and causation.

The first case* is from the *Courrier Médical*, a very interesting observation of amaurosis cured by the extraction of a diseased tooth.

A woman aged thirty years was attacked one day by a very sharp pain in the left upper second molar. The pain soon extended to the eye, and at the end of about eight days the vision of the left eye was entirely lost. The tooth affected by dental caries was extracted; a small quantity of pus came from the antrum of Highmore, flowing from the alveolar cavity, and lodged in the root of the tooth was found a small fragment of wood, the remainder

* From *Recueil d'Ophthalmologie*, January, 1890, p. 59.

of which was discovered in the alveolus, and some days after she recovered her vision.

The patient explained that she was in the habit of using as a toothpick, a small bit of wood, which had broken after penetrating into the cavity formed by the dental caries. This determined a constant irritation of the dental nerve and an inflammation of the wall of the antrum of Highmore. By reflex action the amaurosis of the left eye appeared.

Simon Snell described in the last session of the London Society of Ophthalmology the case* of a young girl of fourteen years, who was exposed to cold soon after the extraction of two diseased teeth, at a time when the congestion of the cheek was still considerable. An acute orbital cellulitis followed. A great quantity of pus was evacuated by an incision at the inferior border of the orbit. Some days later, however, death followed in consequence of cerebral accidents. The *Archives d'Ophthalmologie* (t. x, p. 463) also quotes Snell as reporting in the *Ophthal. Review*, of England, of July, 1890, a patient who presented a suppuration of the maxillary sinus [fistula of orbit] on the left side conjointly with a caries and periostitis of the central upper incisor of the right side. Extraction of the tooth cured the abscess.

UN CAS D'ODONTALGIE, RESULTANT D'INSUFFISANCE DES DROIT
INTERNES.†

[A case of Odontalgie resulting from insufficiency of the internal recti.]

Par le Prof. Ignace Neuschuler (de Turin).

In June, 1884, I was on the point of terminating the treatment of a young lady, in whom I had corrected with glasses a hyperopia associated with a convergent strabismus, when Mlle. C. Z., her sister, who accompanied her, related to me incidentally that, for nearly three years, she had suffered from a singular inconvenience occurring each time that she touched the piano; she was attacked by toothache, which increased progressively to the point of becoming intolerable. Scarcely had she rested when the pains, after diminishing, ceased entirely, and, strange to say, this toothache only appeared each time she played the piano. As she was very fond of music, she sought means of relief, beginning by consulting the family physician, who advised

* Taken from the *Recueil d'Ophthalmologie*, 1890, p. 509.

† Taken from *Recueil d'Ophthalmologie*, 1889, p. 655.

consultation with a dentist. The dentist, after several examinations, found the teeth perfectly sound and could assign no cause for the inconvenience.

Although she had never presented any hysterical symptoms and had always enjoyed good health, her uncle, himself a physician, wished her to consult a specialist in nervous diseases. This specialist, among other remedies, advised electricity, which was scrupulously applied. Other remedies were also attempted, but all proved useless.

The singularity of the case lay in the fact that Mlle. Z. suffered from the toothache only when she touched the piano. while she could read, embroider, and write, without feeling any distress either in the eyes or in the teeth. Her sister even said that Z. was the only one of the family who could read and sew for a long time without feeling the need of glasses, while the other three sisters were obliged to wear them, by reason of hyperopia, with convergent strabismus in two of them. The mother was hyperopic and presbyopic. As I had looked after the vision of all the family except Mlle. Z., I wished, for curiosity, to make an examination of her eyes. Ophthalmoscopically, the fundus of the eyes appeared perfectly normal. The state of the refraction was hyperopia of the latent variety.

The results of the subjective examination were :

$V=1.$

Chromatic sense=1.

Light sense=1.

Periphery of visual field, normal.

Mlle. Z. could read No. 1. of Wecker's typographic scales with some difficulty ; No. 2 was read without any inconvenience and during a long time. I found that she felt no symptoms of asthenopia while reading or sewing. Measure of the internal recti gave a very pronounced insufficiency, and at 50 centimeters, the distance from the piano, this was corrected by prisms of 4° . for each eye, base inward. I explained this to the patient, adding that it was in relation with her odontalgia, and that correction and the use of prisms would verify the basis of my supposition. What surprised me, above all, was the absence of asthenopic symptoms while reading and sewing at the distance of 20 centimeters, as at that distance greater convergence would be demanded. I began to think, however, that Mlle. Z.,

at the latter distance, for reading, must bring into play so great a degree of convergence as to produce an involuntary strabismus, capable of destroying binocular vision, deviating one eye, and forcing herself thus to use a single eye for fixation, while she could not attain this result at 50 centimeters. To convince myself of the truth of this supposition I undertook a series of experiments, among others that of having Z. fix the point of a pencil held at 60 centimeters. Fixation at that distance appeared natural and convergence was well maintained, but in proportion as the pencil approached the eyes fixation became difficult. At 15 centimeters the right eye took a position of divergent strabismus. This was repeated several times, always with the same result. Thus I could explain the absence of asthenopic symptoms by the fact that Z. used only one eye for fixation in reading.

Therefore I prescribed for Z. prismatic glasses of 4° , base inward, asking her to use them in playing the piano, and to return in eight days. After this time she returned very happy as to the result, as she could play for several consecutive hours without toothache. To convince herself that this unexpected result depended on the glasses, she made two different attempts at playing the piano without the glasses before returning, finding each time that the toothache reappeared, with disappearance as soon as the glasses were resumed. Since then—for I have seen Mlle. Z. several times—the result has always been the same, and at the present time she is obliged to use the glasses to avoid the return of the toothache. This observation is a wholly new fact to ophthalmology, and I have waited more than five years before publishing it, to be sure that the odontalgia depended solely on the insufficiency of the internal recti, and that, as the result confirms, it could be corrected by the prisms.

The relation existing between this odontalgia and the muscular insufficiency can be explained, in my opinion, by the anastomosis of the different branches of the trigeminus.

OBSERVATIONS OF DISEASES OF THE EYE OCCASIONED BY AFFECTIONS OF THE TEETH.

By E. T. Ely, M. D.

(An abstract from the *N. Y. Medical Record* of 1882.)

It is a fact of daily observation that grave diseases of the eyes can be caused by diseases involving the fifth pair of nerves in its

terminal branches. The four following cases, from Dr. Roosa's practice and my own, support this proposition in an absolute manner, because they have been watched with great care, and because in each one the relation of cause to effect appeared incontestable. In all these the ocular affection was caused by a primary irritation of the teeth.

CASE I.—*Paresis of the orbicular muscle ; irregular spasm of the ciliary muscle ; monocular diplopia.*—Man, aged twenty-six years, complains that the vision of the right eye becomes blurred suddenly, and that he sees double with that eye ; no redness or pain ; pupil is mobile ; the fundus is normal. There exists a paresis of the right orbicular muscles ; the lids cannot close completely, and there is lachrymation. Without glasses, $V = \frac{2}{5} \frac{0}{0}$; with cyl., 180° , + I. D. $V = \frac{2}{5} \frac{0}{0}$. Attentive examination of the teeth showed nothing abnormal.

The patient took mercury and potassium iodide for some time, but without any advantage. One night he was attacked by a violent pain in one of the upper molars. The following day the tooth was extracted, and an abscess which had formed at its root was emptied. The paresis of the orbicularis, the diplopia and the astigmatism disappeared immediately, and the visual acuity became $\frac{2}{5} \frac{0}{0}$ without the help of a glass. There was no doubt as to the astigmatism, for the vision was taken with the greatest care by means of test-types.

CASE II.—*Paresis of the right internal rectus and of the ciliary muscle.*—Man of thirty-one years. The 15th of December, 1880, he complained that for a week past the vision of his right eye had been blurred and confused. There was no pain or redness ; the diameter and the mobility of the pupil were normal. With a convex glass of .50 D. $V = \frac{2}{5} \frac{0}{0}$. There existed a slight paresis of the internal rectus and a slight paresis of accommodation which required a convex glass of + 2. D. for reading at the usual distance. The root of the first upper molar of the right side was denuded, swollen, and sensitive. The patient was sent to a dentist and mercury and iodide of potassium were prescribed, for he appeared to have had syphilis. Electricity was also advised. A part of the root of the tooth was removed, and the remainder filled. The dental nerve was found dead and alveolar part absorbed ; the contiguous parts were filled with pus. The ocular paresis immediately disappeared as soon as the tooth was cured—toward the

end of January. Other treatment was abandoned some time before.

CASE III.—*Partial paresis of the third nerve*.—Woman, aged forty years. The 3d of June, 1881, she complained of a disturbance of the vision of the right eye, that she could not describe. She said that it commenced with the appearance of a burning pain in the right ear and the corresponding side of the head. The eye was not red, the pupil was dilated and immobile, and the accommodation partially paralyzed. There was opacity of both crystalline lenses. The teeth of the right side were aching and sensitive, and the gums were in a deplorable state. She was advised to consult a dentist. On June 9th the paresis of the third pair had completely disappeared after the avulsion of a tooth.

CASE IV.—*Inflammation of the conjunctiva and sclerotic*.—A man, aged thirty-three years, January 20, 1882, complained of a painful inflammation of the left eye which lasted three weeks. During the last month he had suffered nearly all the time from neuralgia of the left side of the face. We found in this patient an inflammatory spot at the inferior and external part of the bulbus, which appeared to comprise the whole thickness of the conjunctiva, the subconjunctival tissue and probably the sclera; this spot was about 10 millimeters in width, and extended from the corneal margin to the retrotarsal fold and had the appearance of episcleritis. There were epiphora and pain located in the ciliary region. The pupil was small but mobile; vision and accommodation were normal, as well as the fundus. Between the first and second canine teeth above and on the right, a small ulceration was found on the gum, very sensitive to pressure. The patient was sent to a dentist, who found a denudation of the nerve of one of these canine teeth. A dressing was applied for destruction of the nerve, and the neuralgia immediately disappeared. At the end of forty-eight hours the inflammation of the eye had disappeared, although no local treatment had been applied.

RAPPORT ENTRE LES AFFECTIONS DENTAIRES ET CERTAIN
TROUBLES OCULAIRES.*

Revue Clinique d'Oculistique, t. vi., p. 102.

The relation between dental affections and diseases of the eye has long been recognized; in fact we find in Travers and Fick in

* *Par P. Redard.*

1824 and in 1826 some observations on this subject. More recently dentists and oculists are occupied with this very interesting question. Caffé, Motta, Desmanes, Delestre, Galezowski, Decaisne, Métras, and Power have given us valuable documents.

To-day we know perfectly the diseases of the lachrymal passages, and of the orbit consecutive to inflammations having their origin in the dental system and propagated by continuity of tissue. Oculo-dental diseases of reflex origin are less well known and sometimes pass unnoticed, the examination of the dental system being neglected. They are, however, very frequent in our experience, and from researches in the clinics of Abadie and Galezowski we have been able to collect numerous data. The aim of this communication is to afford the view that certain ocular disturbances of undetermined origin (ranged under the vague term amaurosis or amblyopia) recognize as a cause an irritation of the fifth pair in the vicinity of diseased teeth, and are transmitted by a reflex passage to the different membranes of the eye.

We shall not insist on the pathogeny of this affection, referring to the work of Brown-Sequard on the vasomotor nerves and to remarks by the same author.

In consequence of dental lesions, subsequent to caries, when the pulp is involved and when an irritation of the trigeminal nerve follows, we may observe lesions of the various ocular membranes.

The disturbances of the conjunctiva and cornea, especially in consequence of dentition, conjunctivitis, suppurative and interstitial keratitis, and iritis are well known and we shall not dwell on them.

To-day we wish to draw attention to some ocular troubles in relation with dental affections, disturbances which pass as rare because they are often not noted. They are, however, in our opinion, of great importance, in a therapeutical point of view, for it is sufficient to cure the dental affection to see the ocular disease disappear, as if by magic. These disturbances manifest themselves in the muscle, in the deep membranes of the eye, and in the optic nerve. We possess several observations of paralysis or of spasm of the ciliary muscle occurring in young subjects, and recognizing as a cause a dental affection. In these cases it has been sufficient to remove the diseased nerve to see cessation of the paralysis or the ciliary spasm.

A very interesting case of central scotoma without ophthalmoscopic lesion and mydriasis, recognizing as a cause a dental caries (third molar of the lower jaw), has been communicated to us by our friend Despagne.

In a work of Herman Schmidt, in Gräfe's *Archives*, we have found a great number of similar observations. Power insists, with great reason, on the frequency of this variety of ocular disturbances from dental lesions.

We have also met strabismus and paralysis of the ocular muscles, principally in children at the moment of dentition. Gräfe and Michel have noted this variety of oculo-dental lesions. Amblyopia and amaurosis have often been noted in consequence of dental lesions; we ourselves remember having observed, in the service of M. Richet, a case of amaurosis, persisting for a long time, and manifestly recognizing as a cause an irritation succeeding to the extraction of a large upper molar.

The most frequent troubles, those on which we desire to insist, are the amblyopic troubles. These accidents, according to our observations, always follow very nearly the same course. They relate to neuropathic persons, chiefly females, subject to neuralgia and presenting one or several diseased teeth; there exist some painful points of facial neuralgia; the vision is lessened on one side or, more often, on both sides. The ophthalmoscope reveals no lesion. The visual field is normal. Very frequently we have noted the existence of *muscæ volitantes*, of whitish or black striæ, or of foggy vision. Very frequently, with this, there is paralysis or spasm of the ciliary muscle. The light is very annoying, there is a sense of painful weight in the eye; sometimes there exists a conjunctival hyperæmia. What evidently proves that these ocular symptoms are due to a dental lesion is that as soon as the diseased tooth or teeth are removed, all the troubles relating to the eye disappear. In a great number of observations that we have gathered, the course of the affection is that above indicated.

In other cases, the inflammatory symptoms relating to the eye are more intense, the eye is painful chiefly in the ciliary region. There is conjunctival hyperæmia, tension is manifestly increased, the visual field contracted, the cornea cloudy. The painful attacks occur coincident with an inflammatory attack on the side of the teeth, in such a way that it is permissible to demand if, in

some cases of glaucoma, the dental lesions observed are not a cause of this affection. The demonstration of this fact appears to us to have a great importance, and we engage, in cases of glaucoma, occurring in young subjects, in which the causes of this affection are so often difficult to determine, to seek if lesions of the dental system can be incriminated.

I have had occasion to see, at Abadie's clinic, a very interesting case which appeared to me to enter into the category of those of which I am speaking. It relates to a woman, twenty-eight years of age, attacked by glaucoma, with very high tension of the right eye. The left eye was normal. The general health of this patient was perfect, no neuralgic pains; the cause of the unilateral glaucoma was then wholly obscure. Two sclerotomies were made by M. Abadie, producing only momentary detention and followed by return of the trouble. It was then that, in exploring the dental system of this patient, M. Abadie found on the side of the affected eye a very painful dental root of which he demanded the extraction before making another operation on the eye. The extraction of this painful stump was followed, without other treatment being given, by an immediate and sudden lowering of the intra-ocular tension, proving without doubt the effective relation between the ocular affection and the dental lesion.

As a conclusion of our researches we will say :

A great number of ocular affections recognize as a cause an alteration of the dental system. In cases of painful inflammatory symptoms relating to the eye, in cases of amaurosis and amblyopia with *muscæ volitantes*, foggy vision, considerable diminution of the vision, in cases of spasm or of paralysis of the ciliary muscle or of other muscles of the eye, and in cases of asthenopia without apparent cause, it is especially essential to examine the dental system with care, and to begin by instituting a vigorous treatment in this direction if necessary.

Rumeau, in 1887, presented in Paris a thesis, entitled "*Essai pathogenique de quelques troubles de la conjunctive survenus dans le cours des affections inflammatoires consecutives à des maux de dents.*" This work is referred to, as containing many valuable cases, illustrative of the relations between lesions of the teeth and ocular affections. In the preparation of this paper, however, it was impossible to obtain a

copy of Rumeau's work from which his ideas could be gathered.

LACHRYMAL FISTULA OF DENTAL ORIGIN (FISTULE LACRYMALE D'ORIGINE DENTAIRE).*

In the session of February 21, 1883, of the *Société de Chirurgie*, M. Desprès gave a report on a communication of M. Parinaud relative to a case of fistula of the lachrymal region that was attributed to a dental lesion, the mode of transmission being, according to Parinaud, the osseous canaliculæ. Desprès did not share in this opinion, but inclined to the belief that the inflammation was propagated by the lymphatic vessels. In the discussion Magitot said: The report of Desprès on Parinaud's work brings up certain considerations, among which I shall confine myself to the following remarks relative to the *ætiology* and to the *mechanism* of facial fistulæ of dental origin.

In regard to *ætiology* it is well understood to-day that a fistula of this nature should not be recognized as a cause such or such lesion of the dental organ indifferently; there is only one which is capable of producing it, that is *alveolar periostitis*. Caries would not then be, in any case, the direct cause, and periostitis, besides, is quite frequently essential, that is independent of any other lesion of the organ.

In that which concerns the mechanism, it is necessary to recognize first that a fistula of dental origin and the abscess which preceded it would have a seat and a track varying according to the anatomical relation which exists between the point of the root affected by periostitis and the vestibule of the mouth. If the periostitis occupy a tooth of which the whole root responds to the vestibular cavity the abscess will be gingival, and the fistula will open into the mouth; if, on the contrary, the point attacked by periostitis is found at a deeper level than the limit of the groove of the vestibule, the track of the fistula will be directed toward the cellular tissue of the face, and the fistula will be cutaneous.

Such are the most ordinary cases, and the identity of the level between the periosteal initial lesion and the cutaneous or the mucous orifice of the fistula will easily be recognized. There are, however, other circumstances in which a fistula of the same

* Taken from the *Revue Clinique d'Oculistique*, t. iii, p. 62.

origin terminates at a much more distant point, the orbital border, the lachrymal region, as in the cases reported by Parinaud, the malar region, etc. In periostitis of the lower teeth the track of the fistula is sometimes much longer, since it opens in the cervical region and even at the clavicular or sternal. Here the mechanism is little different, but we cannot accept Parinaud's explanation of progression of the processes by the osseous canaliculi, nor that of Desprès, who invokes the rôle of the lymphatics, the existence of which in dental periostitis is very problematic. We think that the mode of propagation is much more simple here. From the initial point of the periostitis is produced by continuity an ostitis of the alveolar wall, which progresses from place to place in the osseous tissue, either by following the track of the vessels, or even by following in the tissues of the maxilla. The inflammation, gaining at a given moment the surface of the bone, produces an osteo-periostitis, invades the contiguous soft parts, and opens on the skin. It is in this way that the fistula reported by Parinaud has gained the lachrymal region.

TROUBLES OCULAIRES D'ORIGINE NERVEUSE ET SPÉCIALEMENT
DANS LA CARIE DENTAIRE.*

Dr. Weinberg, in the Recueil d'ophtalmologie.

Weinberg studies certain alterations of the eye produced by extra-orbital nervous tensions ; among these he insists, after zona ophtalmique, on the affections consecutive to the presence of dental caries. In this regard, there exist two varieties. In fact, one sees cases where the patient presents a very pronounced conjunctivitis, rebellious to all treatment. If, then, the patient be examined, there is found the presence of dental caries, which, even without having caused pain, is the cause of the disease, for all symptoms disappear after extraction of the diseased tooth. Here it relates to morbid phenomena purely reflex. But we see other cases where the patients have dental pain, and in whom the conjunctiva is red; the somewhat opaline cornea may present small ulcerations, the injection of the conjunctiva may be intense enough to cause chemosis, and disturbances of vision may also complicate the symptomatic picture of the disease. The latter cases present a more complicated pathology. In these cases

* Abstract in the *Revue Clin. d'Oc.*, t. iii, p. 115.

there are some reflex phenomena, and some phenomena due to an extension of the dental neuritis of the ophthalmic branch. These facts are very frequent, for Weinberg observed, in less than a year, in Galezowski's clinic, 188 cases of disease of the eye, due to dental caries. In the majority of these cases were observed periorbital neuralgias, especially frequent in women. In the second rank were noted asthenopia, and in the third mydriasis. Finally, in order of frequency, come abscess of the cornea and exophthalmia, with all its consequences.

Having followed this summary of the literature, in a careful manner, we are in position to consider "Dental Reflexes" under the following headlines:

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|----------------|---|--|
| I. ÆTIOLOGY | { | Dental affections causing reflex disturbances. |
| | | 1. Purely nerve reflex.
2. By ascending neuritis.
3. By contiguity of tissue.
4. Mixed modes of transmission.
5. Vasomotor reflexes.
6. By lymphatics. |
| II. PATHOLOGY | { | |
| | | |
| III. CLINICAL. | { | |
| | | |
| ÆTIOLOGY | { | Dental affections causing reflex disturbance in the eye. |
| | | 1. Dentition.
2. Abscess at root.
3. Sensitive dentine.
4. Caries and involvement of pulp.
5. Periostitis.
6. Malposition of teeth.
7. Slow eruption of teeth and consequent pressure
8. Inflammation of antrum of Highmore, after extraction of teeth and from foreign bodies.
9. Exposure to cold after extraction.
10. Death of dental nerve.
11. Denudation of dental nerve. |

Of the dental affections causing eye troubles *dentition* properly heads the list as producing in children inflammation of the conjunctiva and sclerotic, strabismus and paralysis of the ocular muscles. Associated with this condition and nearly akin to it are *Malposition of Teeth* and *slow eruption of Teeth*. Both of these conditions are responsible, in my opinion, for many cases of amaurosis, amblyopia, and especially of iritis. I reported a case * (last year) of partial loss of vision and rebellious iritis occurring in a young lady of twenty-two, caused by non-eruption of permanent teeth. None of the permanent incisors or canines had appeared, though I felt assured that they were in the jaw in a partially formed state.

Abscesses at the roots have produced paresis of the orbicular muscle, irregular spasm of the ciliary muscle, monocular diplopia, and partial paralysis of the third nerve.

Caries, involvement of the pulp, and periostitis have caused central scotoma and mydriasis, glaucoma, *muscæ volitantes*, foggy vision, spasm of the ciliary muscle, asthenopia, ulcerated cornea and lachrymal fistula (orbital cellulitis).

Of the less frequent diseases of the dental system which have been productive of eye diseases may be mentioned consecutive inflammation of the antrum of Highmore, exposure to cold after the extraction of teeth, death of dental nerve, denudation of dental nerve, and sensitive dentine.

Under the head of pathology we find it in order to consider those cases which are produced by pure nerve reflex.

1. *By pure nerve reflex.*

A brief *résumé* of the anatomical relations of certain of the cranial nerves will assist us in making this point clear. The third pair of nerves is distributed to all muscles of the eyeball, except the external rectus and superior oblique, to the iris and to the levator palpebræ. The third nerve sends a filament to the ophthalmic ganglia of the sympathetic, and from this ganglion the short ciliary nerves take their origin and pass to the iris. The ganglion of the sympathetic system receive branches from both motor and sensory nerves

* JOURNAL OF OPHTHALMOLOGY, OTOTOLOGY, AND LARYNGOLOGY.

of the cerebro-spinal system. The fourth nerve is distributed to the superior oblique muscle, and receives a filament from the sympathetic.

The sixth nerve is distributed to the external rectus muscle; in the cavernous sinus it anastomoses with the sympathetic through the carotid plexus and Meckel's ganglion. When the third nerve fails partially, or wholly, to perform its functions, through irritation, reflex action, or paralysis there may result :

1. Falling of the upper eyelid, or blepharoptosis.
2. External strabismus, immobility of eyeball (except in outward direction).
3. Dilatation of pupil, with certain amount of interference with the movements of the iris.

When the patheticus is affected the eyeball is immovable so far as rotation is concerned.

When the abducens is involved, convergent strabismus results. The temporo-facial branch of the facial nerve supplies the orbicularis muscle and when affected the eye remains open constantly.

In the three branches of the fifth nerve most interested, namely, 1. Ophthalmic, 2. Superior maxillary, 3. Inferior maxillary, the lachrymal branch of the ophthalmic sends a filament to the orbital branch of the superior maxillary, and supplies the lachrymal gland, conjunctiva, and integument of the upper lid. The frontal branch of the ophthalmic divides into supra-trochlear and supra-orbital nerves.

The nasal branch gives off a delicate filament, which goes to the ciliary muscle and iris.

The main branches of the nasal go to the internal surface of the lower eyelid, to the lachrymal sac and canaliculæ.

The superior maxillary branch of the fifth nerve supplies the integument on the temple and sides of forehead; two branches pass to Meckel's ganglion, thence two branches are given off; posterior dental nerves, which are distributed to the molar and bicuspid teeth, the mucous membrane of the corresponding alveolar processes, and the antrum.

A large branch, the anterior dental, passes to the teeth

and mucous membrane of the alveolar processes not supplied by the posterior dental nerves. This nerve anastomoses with the posterior dental. Terminal branches are distributed to the lower eyelid, to the nose, and to the lip.

The inferior maxillary gives off three branches from its sensory portion: 1. Lingual to tongue, gums receiving a branch from the facial nerve; 2. Auriculo-temporal nerve to integument in temporal region, auditory meatus, and sending branch to facial; 3. Inferior dental, passing through the substance of inferior maxillary bone, and supplying teeth and integument of the lower part of the face.

Thus the nerves supplying the teeth and the eyes anastomose so freely, and are so intimately related to the sympathetic, that it is often impossible to state positively if a given case is caused by a pure nerve reflex alone.

Do the sympathetic ganglia act as independent nerve centers? From the cranial ganglia the nerve connections to the teeth and eyes are intimate, and experiments by Bernard and Brown-Sequard have answered the above question in the affirmative. The action of nerve reflex may be summed up in the proposition that irritation of dental nerves excites reflex action in cranial ganglia of the sympathetic, which, in turn, interferes with the nutrition of some portion of the eye, or of the entire eyeball and orbit. If carried to its fullest extent, as seen in division of the sympathetic, profound alterations in the eye are observed. Where we have continued irritation of dental nerves, followed by profound effects on the eye, and relieved by extraction, or by giving vent to the products of the inflammation, the method of the transmission of the irritation is wholly reflex. Such a case is the observation, taken from the *Courrier Médical*, of amaurosis, caused by a diseased tooth and antrum of Highmore, and cured by extraction of the offending tooth.

One of the most pronounced cases of pure reflex is the report of the young lady, in whom an insufficiency of the internal rectus caused pain in the teeth.

The cases reported by Dr. E. T. Ely are also in point,

though the second and third cases in Dr. Ely's report lead one to the opinion that the inflammation was transmitted through the soft parts and periosteum. Such cases as are accessible seem to demonstrate that eye affections of a periodic and painful character, accompanied by a minimum of inflammation, and due to dental disease, owe their production to purely reflex action, rather than transmission by contiguity of tissue, or other modes. Neuralgic affections in and around the eyeball are common examples of this mode of transmission, and have occurred in the practice of almost every physician.

2. *By ascending neuritis.*

Cases of so-called transmission of neuritis from one part of the body to another, without the intervening nerves becoming involved, are certainly not good evidence upon which to base the assumption that dental irritation could reach the orbit or eye in the same way. Such cases should be classified under the head of pure nerve reflex.

I have no evidence to prove that ascending neuritis is a factor in the transmission of dental irritation to the eyes.

3. *By contiguity of tissue.*

The relations of the teeth, the maxillary sinuses, and the orbit with its contents are so intimate that inflammatory action beginning in the teeth, alveolar processes, and periosteum can spread to the eye with great facility. This is especially the case where there is destructive action sufficient to involve the antrum of Highmore, as purulent inflammation in this sinus is very prone, if long continued, to push through the floor of the orbit and produce orbital cellulitis and other affections. The danger from extension of the inflammation along the soft parts is not so great, in my opinion, as the bones and soft parts of the face have marvelous recuperative powers, and the tendency of all injuries and benign inflammatory conditions of the face are toward spontaneous recovery, if the products of inflammation have a free vent.

Redard, in his elaborate report, insists that in diseases of the lachrymal passages and orbit, consecutive to inflamma-

tion having its origin in the dental system, the disease is propagated by continuity of tissue.

On the other hand Desprès insists that in the case of lachrymal fistula, reported by Parinaud, the inflammation was propagated by the lymphatic vessels. Of this we will speak later on.

The soft parts of the upper maxillary bone, and the nasal openings of the maxillary sinuses are in close proximity, and any irritation of teeth or alveolar processes, leading to inflammation and swelling of the mucous membrane in the nares, produces very pronounced inflammation of the palpebral and ocular conjunctiva, and may produce inflammation of the tear ducts; this method of transmission certainly stands second to pure nerve reflex.

4. *By mixed modes of transmission.*

Pure nerve reflex is certainly more or less a mode of transference of the irritation in all cases, and is in many cases associated with continuity of tissue as an active agent. Neuritis produces numbness, loss of tone, atrophy of muscles and eventually paralysis. Spasms and tremor are generally reflex phenomena. Where neuritis is a factor, trophic changes occur, which are conclusive evidence of the origin of the disease. But symptoms due to death of the dental nerve, or ulceration accompanied by periostitis, are speedily checked by extraction and cleansing, so we are forced to the conclusion that neuritis is not an element in the production of eye disease consecutive to disease of the dental system, either alone or in connection with other disturbances.

5. *By vasomotor reflexes.*

The vasomotor nerves are so intimately blended with and anastomose so freely with the cerebro-spinal and sympathetic, that it is impossible to accurately estimate the influence which they exert in producing reflex conditions in the eye. Through their influence on the circulation they are connected with nutrition, and in this way their power over the eye and orbit is very great, for good or evil.

Impairment of the normal circulation of the dental sys-

tem would be very liable to produce, through the vasomotor nerves, a corresponding lack of nutrition and consequent impairment of function of the eye. Clinically such a delicate differentiation is impossible, hence two, and frequently three modes of transmission, namely: pure nerve reflex, vasomotor reflex, and continuity of tissue, are thoroughly commingled. It occurs to me, as worthy of consideration, that glaucoma, when occurring secondary to diseased teeth, is a noteworthy example of vasomotor reflex action, and possibly of transmission through the lymphatics.

6. *By the lymphatics.*

Numerous authorities have cited this mode of transference, but no facts have been brought forward to substantiate this opinion.

Numerous citations have been made from the clinical cases as I have proceeded, so that no special recapitulation is required. No words of mine can sufficiently emphasize the importance and imperative necessity of examining thoroughly the dental system of every person suffering from eye disease. Such examinations, followed by proper corrective measures, will result in preservation of sight to many persons.

THREE CASES OF APHONIA.

BY CHARLES W. HAYWARD, M. D., M. R. C. S., L. R. C. P.,
LIVERPOOL.

The following three cases are instructive, as they clearly show that similar symptoms are not always due to identical or even similar causes. Each of these patients complained of hoarseness and loss of voice. There was no complaint of pain in either case. The alteration in the voice was similar in each case, with only slight variation in tone and quality which would not be any guide in diagnosis.

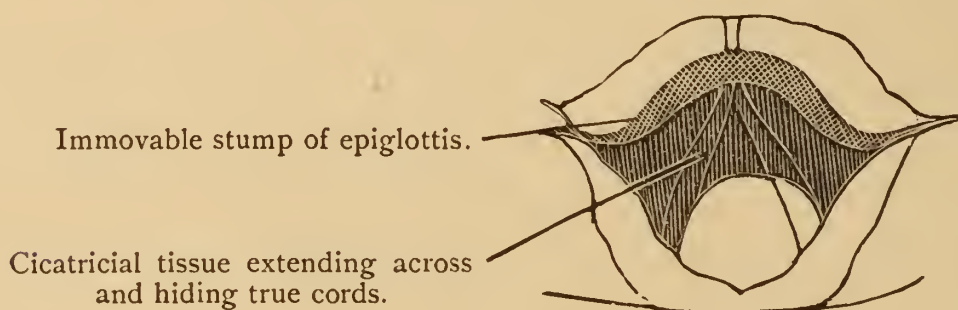
Of course the totality of the symptoms and the history differed in each case, but it was only on laryngoscopic examination that the true nature of the disease, and the wide difference in the pathological conditions, was thoroughly appreciated. These cases also indicate the wide area covered by the symptoms "hoarseness" and "loss of voice," as they show only three out of the many pathological conditions which give rise to these symptoms.

They point out the futility of treating these symptoms without thorough examination of the pathological condition present, and the immense importance of local treatment, in some cases at least—as in Case III—local treatment being the only effective treatment, as internal treatment must have been prolonged, and benefit from its use would even then have been extremely doubtful.

CASE I.—Miss P., aged thirty-one, was sent to me on December 3, 1888, when the following history was noted. She had had a sore throat for some time, but the voice was only affected twelve months last January (nearly two years), after a journey on a

foggy day. The voice was gone on the following day, and has remained so since. Family history was very good ; no tubercular disease, no hereditary, or acquired, specific taint could be found, and the family has always been extremely healthy. General health good. Voice—no tone, only a harsh whisper. Inspiration is noisy and embarrassed on exertion. There was some dysphagia at first, which is now better. On examining the larynx, the parts were found as follows :

The epiglottis had ulcerated away, and there remained only a red, congested immovable stump. The mucous membrane was dark red and inflamed ; the arytenoids were swollen and moved with difficulty, and did not approximate on attempted phonation. The ventricular bands were united across in front by fibrous tissue, which considerably diminished the entrance to the larynx and



caused the difficulty in breathing. The left true cord was hidden from view by this tissue. The right cord could be seen at the posterior end and was thickened and congested.

Lactic acid was applied locally and Merc. biniod. prescribed internally.

On January 25, 1889, the voice was a little better, the condition of the larynx being much the same. The medicine was repeated. She was seen at intervals of about two weeks all through the treatment, and on February 18, the voice was better, and was especially so after each local application. The little expectoration which had been present had stopped, and the inflammation in the larynx was distinctly improved.

March 14. Improving. There is some roughness of the inter-arytenoid mucous membrane. Continue medicines.

March 23. Fresh cold and some increase of congestion in larynx ; breathing easier.

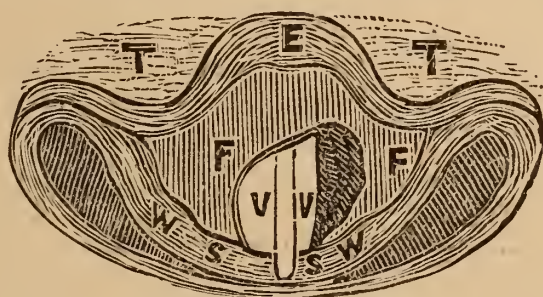
April 4. Voice improving, but conjunctivitis of left eye. This

soon improved under a change of medicines and calomel insufflated.

The voice gradually improved, Kali bichromicum 2, and Kali hydriodicum (1 to 5 grain doses), caused improvement and great benefit was obtained from a course of Iron water at Harrogate, and from iron administered to continue this course after her return. In November her voice was well enough for her to follow her employment as schoolmistress without any inconvenience.

The patient kept in excellent health, and I did not see her again until August of the present year, when she came to consult me about a painful fissure in her tongue. Her voice had continued good, and she informed me that she could sing, and join in the service at church without overtaxing her throat.

Present condition (November 21, 1891). I examined her again to-day. The mucous membrane of the larynx is normal. There is only a stump of the epiglottis, but this is healthy. Arytenoids



T T. Tongue. S S. Cartilages of Santorini. E. Stump of Epiglottis. W W. Cartilages of Wrisberg. V V. Vocal Cords seen through rounded opening in Cicatricial Tissue. F F. Fibrous Tissue.

healthy and movement perfect. True cords healthy and approximate well during phonation. They cannot be seen in their entire length, the anterior end of the right, and the anterior two-thirds of the left cord being hidden by the cicatricial tissue, which extends across between the ventricular bands and which has a hard, whitish, sickle-shaped edge which hides the view of the anterior part of the glottis. During inspiration the true cords are widely separated, but the shape of the opening is altered by the fibrous tissue, the longer diameter being transverse instead of antero-posterior. During phonation the cords are seen through a rounded opening formed by the tissue which stretches across level with the arytenoids; this opening is more to the right of the larynx, showing the posterior half of the left true cord and the posterior three-quarters of the right cord. The voice is strong and only very

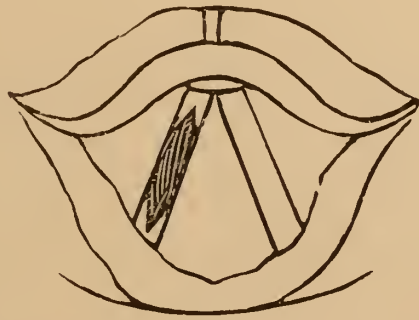
slightly hoarse ; her friends consider that it is about normal. Breathing is almost quite free, and it is only on forced inspiration that there is any harshness or difficulty.

CASE II.—Miss M., aged twenty-seven, was sent to me on January 3, 1891. She had suffered from inflammation of the lungs in the previous April, and since then her voice had gradually gone. She had cough, expectoration, and night sweats, with jerky harsh respiration in both apices. She could only speak in a harsh whisper. On examination of the larynx, the right true cord was found to have almost disappeared, from ulceration ; the left was fixed, and had an irregular projection at the posterior end. The larynx was painted with lactic acid (fifty per cent.), and Hepar 3 was given internally. As the patient resided at a distance, I could only see her once a week, and on the following visit (January 10) she reported slight improvement. Iodoform and magnesia (equal parts) was insufflated, and Arsenicum iodide given. On January 17 she reported that “the voice came back temporarily on Saturday, and when in a warm room it comes back.” The insufflation was repeated and Calc. phos. prescribed.

January 24. Better. Voice can be heard each day, and she feels better ; larynx looks healthier. Lactic acid painted on, and iodum internally. She continued to improve, and with the above local and internal remedies changed about as seemed best, the voice gradually gained in strength, notwithstanding a severe cold, with hemoptysis. The weight increased slightly, but again went down while suffering from the cold, but the cough, expectoration, and appetite all improved. The voice remained very fair, and the patient could speak well though with a “rough” tone. As her voice was better, and her home some distance away, she ceased attending on May 16, and since then I have not heard how she got on. The lung condition was unsatisfactory, and I am afraid that the improvement, although decided, would only be temporary, and that the disease in the lungs would progress.

CASE III.—While attending the *cliniques* of Professors Schröter and Schnitzler, in Vienna, in 1887, I was fortunate in having the following case assigned to me for treatment. A woman about forty-three years of age and of healthy appearance came to the *clinique* of Professor Schnitzler, complaining of loss of voice. This, she stated, first commenced with hoarseness more than six

months previously and had gradually got worse. On examining the larynx, the parts were found normal with the exception of the left true cord, which showed a large cyst. This cyst occupied the middle three-fifths of the cord for its entire breadth, and was rounded, sloping off at the ends, and at the middle being about one-eighth of an inch in depth. It presented a translucent, slightly striated appearance, and during phonation was seen to interfere seriously with the accommodation and vibration of the cord. The treatment adopted was as follows: Having painted the throat with a ten per cent. solution of cocaine, I incised the cyst with Schrötter's guarded intra-laryngeal knife. A clear mucus-like fluid exuded. I attempted to obtain some of this for microscopical examination. I introduced a brush and pressed the contents out of the cyst; but, owing to the "gagging" of the patient, the examination was not reliable, the specimen ob-



tained consisting of ordinary mucus and some blood. I then, by means of Schrötter's pincette, pulled away the cyst-wall and then touched the site of the cyst with solid nitrate of silver. On returning next day, the patient stated that the pain had been very slight, and that she felt the throat improved. The site of the cyst was occupied by a white eschar from the nitrate of silver. The larynx was penciled with nitrate of silver solution (ten per cent.). The penciling was repeated for a few days with a weaker solution (five per cent.), and by about the fifth day the white eschar was gone, and the cord getting to look normal again. For three or four days the penciling was made with chloride of zinc (chloride of zinc, 16; distilled water and glycerine, of each 240) instead of the nitrate of silver, and in about a fortnight the patient returned to her home with the hoarseness almost entirely cured.

I consider that Case I. was of a specific nature, although very careful and searching inquiries failed to furnish any

foundation for this belief. Still, the nature of the changes produced, the general appearance of the larynx and pharynx, and the improvement obtained from mercury, Potassium iodide and bichromate, were, I think, sufficient to warrant this opinion notwithstanding the absence of history. The present fissure of the tongue was diagnosed by a local medical man, where she lived, as commencing cancer, but on her coming to me I was able to reassure her, and great improvement has occurred, especially from Potassium iodide. Once while she was taking the Iodide, she took doses nearly three times as large as I ordered, owing to a defective measure, and various symptoms were produced, including one or two dark-colored tubercles on the forehead. The improvement obtained was most satisfactory, the voice having remained permanently good, although she has hard work teaching in a school five days every week. It illustrates the hopeful prognosis to be made in such cases. The voice had been gone for two years before I saw her, and still it has returned, and by the end of the third year was restored with little impairment, and has remained good.

The second case is an ordinary case of tubercular laryngitis. The pulmonary condition was very unsatisfactory when first seen, but under the local and general treatment the voice was restored and the general health improved. Such improvement, I think, encourages us to give all tubercular laryngitis cases a trial of local treatment, as I have had similar good results in other cases, and in the worst cases have been able to relieve the dysphagia and pain, and render the case a little less distressing.

The last case is one of interest and rarity, and I have been unable to find mention of such cases in the works of Lennox Browne, Schech, and others.

A COMPARISON OF TESTS IN HETEROPHORIA.*

BY E. J. BISSELL, M. D., ROCHESTER, N. Y.

The importance of carefully and correctly estimating any perversion of function of the external ocular muscles is becoming more perfectly and generally appreciated. When searching for the cause of asthenopia or reflex symptoms, an understanding of the condition of these muscles is hardly less important than an accurate measurement of the refraction, although any abnormality of the former is often secondary or dependent upon some error in the latter. The action of these external muscles, which so wonderfully brings about the varied movements and positions of the two eyeballs, is as yet not perfectly understood. Possibly, at times, we have been mistaking the normal for the abnormal or vice versa.

There are many interesting questions relating to this subject, but the scope of this paper is very narrow. My aim is simply to make a slight contribution to the study of the comparative value of the two tests most generally used in estimating heterophoria. Two points are to be considered:

First, does the Maddox rod test and the prism test, as used in the various phorometers, give the same estimate of the position which the axes of the two eyes would most easily assume when binocular vision is rendered impossible?

Second. If they give different measurements in heterophoria—which is more correct? From time to time I have read articles extolling the rod test and claiming greater

* Read before the Homeopathic Medical Society, State of New York, February, 1892.

accuracy for it, but I have not seen any real proof in the way of a systematic comparison. Three months ago I began making both tests on some of my private patients, and in looking over my case-book I find a full record of seventy cases.

At the outset of this work I was confronted by two difficulties. First, inaccuracy in the prisms as marked in degrees by the manufacturer. Second, the lack of a suitable card for making both tests quickly, so as not to consume too much time during busy office hours. The first obstacle was overcome by adopting the new system of designating prisms by prism-dioptrics (P. D.) This is not the place to enter upon a discussion of the merits or demerits of the various systems which recently have been suggested. Suffice it to say that the prism-dioptic method is infinitely superior to the old way of designating prisms, and I believe has some advantages over the other new systems which have been offered for adoption.

The second difficulty was overcome by making a card adapted to the use of the prism-dioptic, applicable to both the rod and prism tests, and which would at a glance indicate the character, and very nearly the amount, of the deviation which the axes of the eyes underwent when diplopia was produced.

The card is 55 x 69 centimeters, and is placed at 5.5 meters from the phorometer or disk containing the glass rod. The scale on the card is therefore made to correspond to the amount of deflection which a ray of light, passing through 1 P. D., would undergo at 5.5 meters. Since 1 P. D. causes a deflection of 1 centimeter at 1 meter distance, at 5.5 meters the deflection would be 5.5 centimeters. This forms the unit of measure as indicated upon the card. I like a large card, because, when diplopia is produced, it gives a better background. The lines forming the scale are 1 centimeter wide and 11 long, and those at the right of the arrow are printed in black, and those at the left in red, as in the Prentice test-card. A hole 2.5 centimeters in diameter is cut at the center of the arrow. Back of the card is placed

a lighted candle or gas jet, so that the flame is directly opposite the hole and near to it. For making the Maddox test, I like a glass rod mounted in a small hand magnifying-glass frame. The room is to be slightly darkened, and the patient first examined for esophoria and exophoria by both tests. In making the Maddox test, the rod is held horizontally before one eye. The flame, which is essential in this test, then appears as a long perpendicular streak of light. The original flame is seen with the other eye. If the streak of light passes through the flame, there is orthophoria of the internal and external recti. If it passes the flame to the side at which the rod is held, there is esophoria; if on the opposite side, there is exophoria. Since the streak of light crosses the entire card, its distance from the flame is quickly determined by the scale above described, thus enabling the oculist to quickly select a prism which will generally neutralize the defect. In testing for hyperphoria the card is turned so as to bring the lines horizontal. The rod is held perpendicularly before one eye, and the light now appears as a horizontal streak. Its position relative to the center of the flame indicates the amount of hyperphoria. The prism tests are familiar to you all, and need not be described. In this test the light back of the card is not essential, but it materially helps many patients, especially those with unequal acuity of vision, to quickly detect the double images. With these explanations, I submit the following tabulated cases. As this is simply a comparison of methods, all cases were treated under the same conditions, *i. e.*, before a mydriatic was applied or any attempt made at correcting the existing ametropia. As it might be interesting to some to know the acuity of vision and character of the refraction, I have stated these in the table.

TABLE
Showing a Comparison of Rod and Prism Tests for
HETEROPHORIA AND ORTHOPHORIA.

No	EXOPHORIA			ESOPHORIA			HYPERPHORIA			ORTHO- PHORIA		VISION		REFRACTION					REMARKS
	Rod.	Prism.	Difference.	Rod.	Prism.	Difference.	Rod.	Prism.	Difference.	Rod.	Prism.	O. D.	O. S.	H.	M.	A. L.	A. M.		
1				3.00	.50	2.50													
2				.75	.75														
3				1.00	.75	.25													
4				2.00	2.00		2.00	.75	1.25										
5	.75	.75																	
6				2.00	1.00	1.00													
7										0	0								
8										0	0								
9	1.00	1.00																	
10				2.00	1.00	1.00													
11				1.00	1.00														
12				3.00	2.25	.75													
13				1.00	1.00														
14				6.75	4.00	2.75													
15										0	0								
16				2.00	1.00	1.00													
17										0	0								
18	1.00	1.00								0	0								
19										0	0								
20				2.00	2.00														
21										0	0								
22				1.50	1.50														
23	3.00	3.00					.75	.75											
24	14.00	12.00	2.00				5.00	5.00											
25										0	0								
26										0	0								
27										0	0								
28										0	0								
29				2.00	2.00		.50	.50											
30				10.00	7.50	2.50	.50	.50											
31										0	0								
32	4.00	0	4.00							0	0								
33										0	0								
34				1.75	1.00	.75				0	0								
35																			
36				1.50	1.00	.50	.75	.25	.50										
37							.25	.25											
38				1.00	0	1.00													
39	0	1.00	1.00																
40							.50	.50											
41							.50	.50											
42										0	0								
43				.75	.75														
44				5.00	3.00	2.00	.50	.50											
45										0	0								
46	4.00	1.00	3.00				3.00	1.00	2.00										
47				3.00	0	3.00													
48	.50	0	.50																
49				.50	.50														
50				5.00	5.00														
51				.25	.25														
52										0	0								
53				1.00	1.00														
54										0	0								
55				6.00	5.00	1.00													
56	5.00	2.00	3.00				2.00	2.00											
57	.50	0	.50				2.00	2.00											

No	EXOPHORIA			ESOPHORIA			HYPERPHORIA			ORTHO- PHORIA		VISION		REFRACTION				REMARKS
	Rod.	Prism.	Difference.	Rod.	Prism.	Difference.	Rod.	Prism.	Difference.	Rod.	Prism.	O. D.	O. S.	H.	M.	A. L.	A. M.	
58							1.00	1.00				200	200		Hd.		Md.	
59												200	200					
60	3.00	.75	2.25	3.00	.75	2.25						200	200	Hd.				
61	.75	.75					.25	.25				200	200	Md.		Sd.		
62				5.00	3.00	2.00						200	200	Sd.		Sd.		
63				.50	.50							200	200	Md.		Sd.		
64	.50	.50										200	200	Md.		Sd.		
65				1.00	1.00							200	200	Md.		Sd.		
66										O	O	200	200	Sd.		Sd.		
67				3.00	2.00	1.00	.50	.50				200	200	Md.		Md.		
68	5.00	2.00	3.00				5.00	4.00	1.00			200	200	Sd.		Sd.		
69				1.00	.50	.50						200	200	Sd.				
70	1.50	1.50										100	100		Sd.		Hd.	

All measurements were taken at 5.5 meters and are recorded in P. D. (Prism Dioptrics.)

O=Orthophoria. In the columns indicating the character of the refraction, Sd=slight degree (.25 D. to .75 D.), Md=moderate degree (1. D. to 2. D.), Hd=high degree (all above 2. D.).

EXPLANATION OF TABLE.

	TOTAL	ROD AND PRISM SAME RESULT	ROD AND PRISM DIFFERENT RESULT
Orthophoria	18	18	..
Exophoria.....	9	5	4
Exophoria with Hyperphoria.	7	2	5
Esophoria.....	26	12	14
Esophoria with Hyperphoria.	6	2	4
Hyperphoria.....	4	4	..
Hyperphoria with Exophoria.	7	5	2
Hyperphoria with Esophoria.	6	4	2

Deducting the 18 cases of orthophoria there are 52 cases of heterophoria. In 25 of these cases the rod and prism gave the same result and in 27 a different result, or a little over half of the cases.

In the 27 cases in which there was a difference, ranging from .25 P. D. to 4.00 P. D., the rod test gave the greater

deviation except in case No. 39, which was amblyopic. I submit the following reasons why the rod test is more accurate and why it so frequently shows a greater defect :

I. Diplopia is not produced by changing the planes in which the muscles normally work.

II. The images being dissimilar in form, there is not as great an effort at fusion. This is shown by the fact that only 4 cases out of 17 cases of hyperphoria showed different results by the two tests ; while in the 48 cases of exophoria and esophoria there were 27 cases showing a difference, it being well known that the power of the eyes to fuse images is much greater in the horizontal plane than in the perpendicular.

III. The distance of the streak of light from the flame does not keep changing, as does often the position of the flames in the prism test. This would indicate that in the rod test the eyes readily assume a position of least strain, and that there is little effort at fusion.

IV. The measurements by the rod test seemed to more nearly correspond with the power of abduction and adduction and with the symptoms of which the patients complained.

RHINITIS CHRONICA ATROPHICANS FETIDA, OR OZÆNA.

BY J. B. GARRISON, M. D., NEW YORK.

Of the various catarrhal conditions that meet the medical man, there is no one, it seems to me, more distressing at the same time to the patient, the intimate friends, and the doctor, than the one whose name heads this paper for a title. I say distressing to the patient, for as soon as he has learned of the odor—and by the way he is usually the last one to find it out—he is in a state of constant fear lest he should offend someone by his presence, and in many cases avoids society entirely, and becomes a recluse. I say distressing to the intimate friends, because they, who desire to do the most for him, pray that he may not appear in their presence, so disgusting is the odor. I say distressing to the doctor, for aside from the disagreeable nature of the first treatments, the time needed to effect anything like a cure is so long that most patients tire of coming, and leave, thinking they have not been properly handled, or they would have been cured long ago. The writer, however, has learned never to enter into the treatment of a case without first having given the patients distinctly to understand the tedious character of the case, and also of requiring a promise of patience and perseverance—without which they need expect no good results in the end.

Ozæna is a disease limited to the nares; non-ulcerative; without any diseased bone; the fetid odor being derived from the changes in the secretions retained therein. The odor was formerly believed to be due to an ulceration in the

nares. Celsus, 40 B. C., says, "The Greeks gave the name ozæna to nasal ulcers covered with crusts of a stinking odor." Galen also taught the same doctrine, but then Galen said catarrh was generated in the stomach by the inordinate heat of the liver, and ascended to the ventricles and pituitary glands of the brain through the veins and arteries as clouds of vapor.

Almost if not all writers on the subject considered the ulcerative theory the proper one until 1791, when Sauvages made and defended the distinction of ozæna without lesion of the nares.

Reininger, in 1722, however, considered the odor due to the putrefaction of the secretions retained in the frontal, ethmoidal, sphenoidal, and maxillary sinuses.

An atrophic condition of the nares is usually, but not always, an accompaniment of ozæna.

Regarding the age in which it is most frequently found, it may be said to be prior to thirty years, and is seen oftener in the female than the male. While there is lack of proof of the contagious element, two or more children of the same family are sometimes so afflicted.

A scrofulous or specific taint is believed by many authorities to exist where ozæna and atrophic rhinitis are found in the same subject. Frequently, in eliciting the history, we may find an attack of measles or scarlatina to be the starting-point of the disease. Schaeffer tabulated 123 cases of ozæna and concluded that 99 were due to struma, and 20 to syphilis. Gottstein reported 12 cases, and traced 2 to scrofula, but could find no specific history at all in any of them.

Careful examinations, both rhinoscopic and *post-mortem*, have demonstrated the fact that the odor does not depend upon the existence of ulcers in the nares. The removal of the crusts shows the membrane less vascular, more or less atrophied, but always intact. The odor then seems to be entirely dependent upon the putrefaction of the retained secretions in the nares, and if the nasal fossæ can be properly cleaned, and kept so, the odor will not remain.

First among the symptoms of ozæna is the presence of a nasal discharge of an offensive odor, but this is by no means conclusive, as an examination may disclose the presence of some foreign body, such as shoe buttons, a piece of rubber tubing, or something of the sort. Or there may be a polyp, or caries and necrosis of bone.

When the rhinoscope is called to our aid, we see masses of dried mucus, and crusts, that have become fetid, and frequently we see also nasal chambers that are voluminous from the thinness or almost entire absence of the inferior turbinated bodies. In many cases the first examination reveals masses of crusts covering almost the whole nasal cavity, and extending into the pharynx so as to be visible below the soft palate, interfering markedly with free and natural respiration, and the relief experienced by the patient when these are removed is wonderful.

The facial expression will in many cases direct us to the detection of the malady—the strumous facies, thick lips, prominent cheeks, enlargement of the submaxillary glands, and especially the characteristic depression of the nose near the frontal bone, which causes the nasal orifice to open anteriorly, and which is the saddle nose of Zaufal. The Emperor Nicholas of Russia recruited his regiment, the famous “Imperial Nosegay,” from men bearing this peculiarity upon their faces. It was said of them that they were fearless of all danger, but upon being finally repulsed by a French regiment, they were accused of cowardice, to which their rejoinder was, “that they could, and would fight any foe, but the infernal smell of the garlic-eating Frenchmen they could not stand.” In that case it appears that their olfactory organs were well preserved, whether they had ozæna or not, which seems somewhat unlikely, as in many cases the sense of olfaction may be either partially or entirely lost, and as a consequence nutrition may be seriously interfered with, by rendering certain foods distasteful, particularly meats. The sensibility of the velum pendulum palati is usually much lessened, rendering a posterior rhinoscopic

examination much easier of accomplishment than it otherwise would be.

Prognosis.—The cases which apply for treatment will, most of them, need a long period of treatment, and many become discouraged and cease their visits, or else after a time, being greatly relieved, think further expense or waste of time, as they may say, unnecessary, thereby causing many relapses where there ought, no doubt, to be cures.

Youth and good general health are, no doubt, prerequisites for a favorable prognosis; but a proper treatment can place even the most aggravated cases in such a condition that they shall no longer be afraid to seek admission to the society they have long felt need to shun.

Treatment.—First of all in the treatment of ozæna is that condition so close to godliness—cleanliness.

Every crust, to the merest point, must be sought out, and be carefully removed.

This requires much care and no small amount of skill. The post-nasal syringe is an indispensable part of the armamentarium, and the solution, which we find of great service in softening the dried mucus and crusts, is as follows:

R	Glycerinæ.....	℥ ss
	Sodæ Chloridæ.....	3 ss
	Phenol Sodique....	gtt x
	Aquæ Tepidæ....	℥ viii
	M.	

The use of the cotton mops, after this has been freely used, is of great assistance. They are made by taking a small piece of absorbent cotton, and twisting it on a metal applicator made for the purpose, and are exceedingly useful in completing the cleansing of the nasal cavity as well as for making applications of oil, etc., to the parts afterward.

The use of the galvano-cautery is of great service sometimes in removing the masses of crusts from the nostril. The spiral electrode should be introduced in the nares cold, then pressed against the crust to be removed, and the current turned on, when the crust will adhere to the electrode,

and may be lifted off entire. In a case under treatment a short time ago, where there seemed to be some putrefied secretion yet remaining which could not be seen, the use of the electrode into the depression of the floor of the nares brought away a hardened plug, and the odor was entirely removed.

There are many formulæ given by different authors for use in the nares with a view of preventing the formation of crusts, but the time at our command forbids the mention of many. One, which is a favorite with Prof. C. E. Beebe, and which we have tried with good results, is composed as follows :

℞ Sol. Ichthyæ.....five per cent., or grs. xlviii
Sol. Menthol.....one per cent., or grs. x
Fld. Albolene..... ℥ ij
M.

The parts must have been previously cleansed, then anointed with the pure Albolene, when the above may be applied by means of the cotton or with an atomizer. On first application it may be necessary to still further dilute this on account of the burning.

I am in the habit of using the galvano-cautery as a means of toning up the mucous membrane and thereby rendering the secretions less liable to remain and become inspissated. My mode of using it is to take the ordinary cautery knife, introducing it cold, having previously rendered the parts somewhat insensible by means of a four per cent. solution of cocaine, then turning on the current sufficiently to heat it to a dull red, draw it lightly over, just causing a white film to be left where it touched, and the effect has been very pleasing.

Last, but by no means least in the treatment of ozæna, is the necessity of keeping the bodily health at the highest possible standard. Good, nourishing food should be furnished, and the administration of cod-liver oil is to be recommended in the majority of cases. The proper homeopathic remedy must in all cases be faithfully looked for and chosen.

Aurum mur. and Kali bichrom. are of frequent benefit, but the individual case must be studied in order to get the one that will do the most good.

Summing up, let me say that no case should be considered past the stage where good results may be expected; for all can be benefited, their lives made endurable to themselves, and their presence a pleasure to their friends, and many may be permanently cured.

A CASE OF PARALYSIS OF THE EYELIDS, EXHIBITING SOME PECULIAR FEATURES, CURED BY AGARICUS.*

BY E. H. LINNELL, M. D., NORWICH, CONN.

Mrs. L., whose case I am about to narrate, first consulted me May 9, 1891. She was then twenty-seven years old, had been married two years, but had not been pregnant. She was of an exceedingly nervous and excitable temperament, but with the exception of a "slow fever" at the age of fifteen and occasional attacks of gastralgia, she never remembered to have been sick. Her father and mother, she told me, were very strong and well. One brother had always been delicate, due, she thought, to an injury of the spine when quite young. A sister, also of delicate constitution and never strong, died a few years previously of dysentery. Another brother and sister were living, and in the enjoyment of good health. Every member of the family, father, mother, brother and sister, was deaf, and her own hearing was considerably impaired in consequence of a chronic otitis media catarrhalis. As stated previously she was of a very nervous temperament, and during the six months prior to the seizure which I shall presently mention, she was more than usually excitable, so that, at times, she appeared almost insane, starting at trifling noises and very timid and apprehensive on slight provocation. During this period of unnatural excitability, she woke on one occasion from an afternoon nap to find herself completely blind in

* Read before the Homeopathic Medical Society, State of New York, February 9, 1892.

the right eye. This lasted about half an hour, gradually passing off like the lifting of a fog.

In the spring of 1890, just preceding a menstrual period, which was always attended with a good deal of pain, she had a very severe headache, commencing on the vertex and extending over the left side of the head. She had not been a frequent sufferer from headaches, and this one seemed to be almost unendurable, and in the hope of gaining relief she applied freely to the forehead and vertex, and to the nape of the neck, a liniment that, as she expressed it, "was being passed around." A few hours afterward her friend noticed that her face was drawn to one side. She retired as usual, and rested well. The following morning there was paralysis of the left side of the face, with lagophthalmos of the left eyelids, paralysis of the tongue preventing speech, and ptosis of the right upper lid. The headache continued severe and was attended with distention of the superficial veins of the scalp on the left side, especially of the postauricular veins. Menstruation commenced and continued as usual in all respects. There was marked twitching of the sound side, especially of the right lids, and right side of the upper lip. She consulted an old-school physician of established reputation, under whose treatment there was marked improvement during the first week, so that she regained the power of speech, and the face became nearly natural. Here, however the improvement ceased in spite of treatment continued for twelve months. The twitching of the muscles continued, and she experienced severe neuralgic pains in the distribution of the trigeminus on the right side. The initial headache, it will be remembered, was on the *left* side, but the neuralgia was altogether on the *right*. When she consulted me, in addition to the twitching and the neuralgia, there was partial ptosis of the right eye, and partial lagophthalmos of the left. The condition, she thought, had remained substantially unchanged since the first week succeeding the initial seizure. The lid could be only partially raised, and she stated that every morning the eye was entirely closed for some time, and that frequently during the day it would

become closed for an hour or more, and that at no time during the past year had she been able to open it fully. The left upper lid was retracted, making the palpebral aperture appear much wider than the right. This eye could not be tightly closed, but by a special effort the edges of the lids could be approximated. The left orbit was slightly larger than the right, and on a slightly higher plane, so that the left pupil stood higher than the right, which added to the unsymmetrical appearance of the face. During the neuralgic attacks there was a blurring of the vision of the right eye, which was considerably defective at the best. She said she never had had diplopia. The refraction was as follows: V. O. D. = $\frac{1}{7}$ °; with —3.50 D^c. Ax. 180° V. = $\frac{1}{4}$ °. V. O. S. = $\frac{1}{10}$ °. The ophthalmoscope revealed a normal condition of each fundus, and the tension of each eye was also normal. The phorometer showed a right hyperphoria of $\frac{1}{2}$ °, somewhat to my surprise, as from the apparent position of the left eye upon a higher plane, I expected the reverse. An esophoria of $1\frac{1}{2}$ ° in accommodation was also observed. I did not make a careful examination of the ears, noting simply a diagnosis of otitis media catarrhalis chronica, and the fact that it was necessary to raise the voice in talking with her.

As before mentioned, the original paralysis came on at the menstrual period, and during the twelve months thereafter she noticed a decided aggravation at such times. Agaricus 6x was prescribed. She came again after six weeks with the report that she had been nearly free from pain, twitching of lids, and blurred vision since the former visit, and on the day before, the right eye had been closed for the first and only time. She had also been free from pain in her ears, and her hearing was slightly better. The movements of the lids now appeared natural. V. O. D. = $\frac{1}{7}$ ° as before, but —3. D^c. Ax. 180° now brought it up to $\frac{1}{3}$ °. Agaricus was continued. I did not see her again until January 26, 1892, seven months later, when she said: "The second bottle of medicine you gave me cured me. I have had no return of the trouble with my eyes, no drooping of the lids,

no blurring of vision, no pain and no twitching." She complained only of slight asthenopic symptoms on using her eyes, due to the astigmatism and heterophoria, for the relief of which she came. V. O. D., then, with -2.5 D.^c Ax. 180° $+ 1.5$ D.^c Ax. $90^{\circ} = \frac{10}{20}+$. A slight hyperopic astigmatism of $.5$ D.^c was also noted in left eye. Right hyperphoria of 4° was now found, undoubtedly existing previously in a like degree but latent. Under the use of senega, faradism, and the use of prisms it diminished in a few days to $1\frac{1}{2}^{\circ}$. She is still under treatment at the time of writing. The increase of visual power is perhaps only apparent. Perhaps I did not make as thorough a test of her refraction at first because her eyes were not in a condition to permit of her using them, and I preferred not to give her glasses at that time. It is quite possible, however, that a degree of impaired vision attended the paralytic symptoms, and was induced by the same lesion.

What that lesion was, and where it was situated, has been to me an interesting question, and one I have not been able to answer satisfactorily. Was the connection with menstruation a mere coincidence? I am inclined to differ with the physician first in charge of the case, who attributed the attack to the liniment used, whatever that may have been. The coincident paralysis of the hypo-glossal, of the seventh on the left side, and of the fibers of the third supplying the levator palpebræ superioris on the right side, while motor spasm and hyperæsthesia existed in the area of distribution of the other branches of the trigeminus could, it seems to me, be caused only by a circumscribed lesion in the vicinity of the nuclei of origin of these nerves. I regret that I did not see the case earlier, and learn more exactly from my own observation the character and symptoms of the initial attack. It seems reasonable to attribute her recovery to the medicine prescribed. After she had remained in *statu quo* for twelve months, such rapid improvement following its employment must have been more than a mere coincidence.

My attention was directed to Agaricus in this case by the record of its successful use in amblyopia by Dr. Wm. E.

Rounds, published in the JOURNAL OF OPHTHALMOLOGY, OTOTOLOGY, AND LARYNGOLOGY for January, 1891. Dr. Rounds's case was somewhat similar to mine in that his patient was extremely neurotic, the loss of sight was preceded by severe headache and there was present, also, incomplete ptosis of the right eye and much jactitation. In the literature at my command I have not been able to find any record of facial paralysis caused by the drug. It has produced paralysis of the legs in animals, and in fatal cases of poisoning in man, autopsies have demonstrated intense congestion of the brain and meninges, and softening of and sanguineous effusion into the cerebellum. Allen says in his *Materia Medica*: "Paralysis results as a primary effect of large doses or as a reaction from prolonged spasm." The paralytic symptoms in the case reported above, therefore, although not found in its pathogenesis, do not counter-indicate its employment. And I am sure no one familiar with the symptomatology of *Agaricus* will question its homeopathicity to every other symptom exhibited by my patient.

RHINITIS MEMBRANOSA.*

BY H. WORTHINGTON PAIGE, M. D., NEW YORK.

Medical literature treats this disease very meagerly. In only one of several works on diseases of the nose and throat to which I have access, do I find anything written of this affection, either as a special disease or as a pathological condition accompanying any other disease. In the one work in which I did find it mentioned, it is rather indefinitely handled as to ætiology and treatment, but is well described, except in one point on which I take issue with the writer and will mention later.

It is a rare affection, it is true, but not so rare, however, but that the careful observer may now and then see a case at long intervals. In the throat department of the New York Ophthalmic Hospital one case was treated in 1890 and two cases during the year 1891. In Dr. Malcolm Leal's clinic of that institution I have recently met two cases, one of which is now in my care. In Dr. C. E. Beebe's clinic at the same hospital a well-marked case is under treatment at the present writing.

Ætiology.—Of the causes we know little. Why a case of apparently simple acute rhinitis should assume the fibrinous exudation, I do not know. Bosworth claims it due to a germ, basing his conviction on clinical experience and also on the theory that all croupous deposit is due to some morbid change in secretion from germ presence. Just how clinical observation *convinc*es him of the germ cause I do not

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know, as he admits the bacteriologist has not as yet described or discovered a germ for this disease. I have personally seen no cases of this affection in the adult. The two cases I have handled were very similarly affected. They were two boys, not brothers, one seven, the other thirteen years of age. Were delicate in appearance with a tendency to the strumous diathesis. In both the nostrils were enlarged, with moderate chronic catarrhal rhinitis. In these, and the two other cases I have seen, the nose was naturally thin, the kind of a nose which from its very shape never offers a free passage of air, and becomes completely stenotic from every simple rhinitis. I have thought, might not the morbid fibrinous exudation of rhinitis membranosa be due to the severe pressure exerted upon the puffy infiltration of a naturally simple, acute catarrhal rhinitis, by confining it in such a narrow nasal cavity, based on some peculiar idiosyncrasy of the patient's strumous habit? The cases I have seen are too few in number for me to any more than surmise this. Whether those who believe a croupous exudation to be caused by the presence of a germ, think that the germ *primarily* causes the symptoms of acute nasal cold that precede the membrane, or that the *acute rhinitis* is the primary factor and gives the germ a chance to start a colony I do not know. Suffice it for practical purposes to say that:

Symptoms.—The first condition of rhinitis membranosa is that of acute catarrhal rhinitis or nasal cold, with malaise, anorexia, and the usual symptoms. Now such cases, as a rule, do not consult a physician until the disease is well under way and the nasal stenosis has been annoying them for a day or two. By this time the fibrinous deposit is established. I did not take the temperature in my cases because at the time of the first examination both the patients were feeling so well, barring nasal symptoms, attending school and enjoying play, that it did not seem necessary, and I doubt the presence of more than a degree of fever, and possibly none. They had then felt the symptoms four or five days.

Appearance Locally.—Local examination revealed the presence of a tough, fibrinous membrane about three lines in thickness, covering the surface of the middle and inferior turbinated bones and extending well forward into the nasal vestibule, nearly to the cutaneous line. In one case the septum was involved but not in the other, and in fact the deposit is most usually confined to the lateral walls. Owing to the almost complete atresia, it was very difficult to make a satisfactory examination of the posterior nasal region from the anterior. From the posterior, however, by means of a reflecting mirror I satisfied myself that the deposit was limited to the anterior portion of the nasal fossæ. The false membrane was covered with thin albuminoid mucus, which was oozing out, incrusting the nostril and excoriating the skin of the upper lip. Stenosis was complete, thus preventing proper personal cleansing of the nose. The false membrane, when cleaned of the superabundant mucus, was white, glistening, very tough and adherent, so much so that free hemorrhage took place from the denuded membrane underneath wherever it was forcibly detached. On this point I differ with one writer who says that the membrane is easily detached *without* hemorrhage, and makes this his chief point of differentiation between this disease and nasal diphtheria. In the cases I have seen of undoubted membranous rhinitis, detachment was followed by more or less hemorrhage, and while a mild case with light croupus deposit might not bleed, I still believe this symptom not at all incompatible with this condition or with the diagnosis of membranous rhinitis, and in fact quite the usual thing, and would base my differential diagnosis on other and more important symptoms. It resembles nasal diphtheria and, by the hasty jumper at conclusions, might be mistaken for that disease. A careful examination of details will, however, show many decided points of difference. Negatively stated they are—absence of any marked pyrexia or constitutional symptoms; pulse natural, not quick and thready as in diphtheria, and no physical prostration worthy the name. No

acute glandular involvement. I say *acute* because in one case owing to the foundation struma there was some chronic induration of the cervical glands, and in view of the diathesis I believe usually present, it would not be unusual or suspicious to find this accompaniment—but not acute. The discharge is thin, albuminoid mucus, sometimes bloody (if the nose is blown violently enough to detach portions of the membrane) and usually excoriating, evidently more from the constant moisture of its pressure than from any acrid character it may possess. This is in comparison with the dark, acrid, and many times fetid discharge of nasal diphtheria. One marked and important diagnostic point of difference of this disease from diphtheria is the location of the false membrane. The latter, in all cases I have observed or heard of in membranous rhinitis, is confined to the anterior two-thirds of the nasal cavity, *not* involving the pharynx or naso-pharyngeal region, and having no accompanying faucial symptoms. I have never seen a case, and doubt the occurrence of a case of nasal diphtheria that was not preceded or accompanied by some pharyngeal or faucial lesions characteristic of the disease.

Treatment.—Judicious local and internal treatment will show prompt results in mitigation of distressing symptoms, and leave the nose in normal condition in from ten days to two weeks. The old-school specialists pin their faith to tincture of iron locally and internally. We can do better.

Local Treatment.—The indications for local treatment are to destroy and remove the membrane, relieve the distressing stenosis, facilitate free nasal drainage, and protect adjacent surfaces from excoriation. To reduce the engorged and swollen tissues so as to make local applications for the removal of the membrane more effective, as well as to relieve stenosis and promote comfortable breathing, nothing equals the Cocaine hydrochlorate, 4 per cent. solution. Apply this freely and thoroughly by means of a cotton carrier. It is not readily absorbed owing to presence of the pseudo-membrane, but will ultimately, though slowly, permeate to the subjacent

tissues and exert its constricting powers on the circulation, thus reducing materially the hypertrophy and permit some degree of comfortable respiration through the nose. After cleansing with cotton, make a thorough application of Hydrogen peroxide, using gentle friction in applying it. It is a solvent of this croupous product and every application reduces it in thickness. I apply it thoroughly several times at a treatment, wiping off the saponaceous product each time. I then again apply thoroughly the solution of cocaine, and while parts are still moist from its presence I bathe them freely with a solution of Menthol (10 grains to the ounce) in Benzoinol, Albolene, or Glymol. This latter solution has a decided antiseptic and anæsthetic effect in itself, and prolongs the effect of the cocaine, besides acting as a soothing and protective covering for the adjacent surfaces, nostril, lip, etc. This treatment should be carried out daily and the patient supplied with an oil atomizer and the oleo-menthol solution, or an ointment of menthol in white vaseline, for frequent use at home.

Constitutional Treatment.—Offers a few very effective remedies. Kali bichromicum gives us the best picture of the condition, and is usually the only remedy required. If there is some chronic glandular enlargement and hypertrophied tonsils, Mercurius proto-iodide is most indicated. If a specific taint is present Kali iodatum will best do the work. These remedies act most promptly in the first centesimal trituration, given four times daily. The general nutrition must not be neglected, and the patient should take cod-liver oil in emulsion. This I believe very essential, as it seems to fill nature's want in these and similar cases. Some of the malt preparations *might* be beneficial, but I put far more faith in cod-liver oil as an alterative and tissue builder. The patients with this disease are usually debilitated, and while they may feel fairly well, they look pale and have little appetite. Good nourishing diet and general hygiene are important, and these with cod-liver oil and one of the remedies mentioned as indicated, continued with local treatment, will

hasten the cure of the local disease. The general condition which favored it may then be brought up to standard by continuing the cod-liver oil, care, and diet, and persistence in administration of some indicated homeopathic remedy from among the Calcareas, Barytas, Ferrums, Arsenics, or Sulphurs.

PARALYSIS OF THE THIRD NERVE WHERE
GELSEMIUM WAS THE "SIMILIA."—A
SHORT STUDY OF A NEW EPIDEMIC NA-
SAL DISEASE, OF ENSENADA, MEXICO.

BY JOSEPH RODES, M. D., SAN DIEGO, CAL.

About a fortnight ago, a patient presented herself at the office, with a right-eye trouble, which came on suddenly during the preceding night, "without a cause" as far as she knew; as it was such a typical case of its class, the reader will pardon the writer if he goes over the presenting symptoms as they were gone over in the diagnosis.

She complained of heaviness of the upper lid, and of diplopia when it was raised, of fullness or bulging sensation in the affected ball, aching deep in the orbit; glare from bright light, blurring of vision for near work, and slight vertigo, worse using the right eye alone. Tension was slightly increased, and her head was inclined toward the left shoulder. There was dilatation of the pupil, and careful testing failed to elicit any response to light or accommodation. When both eyes were directed forward, there was apparently little deviation of the unsound eye, showing the external rectus had not forcibly taken the "upper hand." The movements of the eye were limited in the upward, downward, and inward directions—the outward movements alone remaining.

On examining in the dark room, the false candle image was oblique and inclined toward the right side; it seemed nearer and higher to her than the true image. When she looked toward the left, the distance between the images was proportionally increased. On looking up, the vertical distance and the obliquity were increased; on looking down, decreased.

The cause (or causes) for this paralysis was carefully and scientifically searched for, but none could be found. Quite likely it was due to some pathological condition existing in the course of the nerve, between its origin at the inner surface of the crus cerebri and its exit through the sphenoidal fissure. For evidently, from the completeness of the paralysis, the lesion occurred at a point where the receiving and distributing branches were united.

Now comes the most important feature of the case—the *homeopathic* cure. Although galvanism or faradism might have been useful, they were purposely omitted, until a fair trial of the indicated remedy was given. Gelsemium 1^x was given; certainly all the subjective symptoms pointed to this, and the writer has proven, on himself, that Gelsemium can produce paralysis of the ocular muscles. The patient was seen several times during the next few days; although the patient claimed, at the first visit, she was getting worse and worse, from the very first dose she improved, and this continued uninterruptedly until the cure was complete; no other drug was taken. Does the reader doubt that this was a cure, under the guidance of the great law of *similia similibus curantur*?

Epidemic nasal diseases.—During the months of November and December, of 1891, there appeared, particularly among children, of the seaport town of Ensenada, Mexico, a nasal disease, and it was the good fortune of the writer to see a number of cases. It began with a high degree of congestion of the entire nasal mucous membrane, posteriorly it blended into the pharynx. This congestion was accompanied by frontal headache, fever, ranging about 100°, and many of the symptoms of acute rhinitis. Quickly following this onset, came a condition of false membrane throughout the entire nasal cavity—simulating very closely a diphtheritic deposit. The deposit was yellowish-white, and when torn off by the child's efforts to clean out the nose, presented the raw and hemorrhagic base, so characteristic of diphtheria; this rapidly re-formed. Epistaxis was marked. The discharges were peculiarly offensive and

irritating to the skin, which, in almost all the cases, became raw and eczematous around the alæ and upper lip. There were no constitutional symptoms similar to diphtheria—no asthenia or paralysis, no deposit or more properly exudate of false membrane on the uvula or soft palate posteriorly. Belladonna seemed to be the first remedy and Kali bichromatum later on. The eczematous condition set up by the discharges seemed to hang on for a long time. Sulphur finally helped this. The children were kept well nourished, and their nasal cavities clean by antiseptic sprays.

These cases are reported only because of their local manifestations being so similar to nasal diphtheria, and their general symptoms just the opposite, inasmuch as the nasal form is so severe and fatal.

Ensenada, like most of the small Mexican towns, is absolutely void of any system of drainage otherwise than nature gave it, by being situated on the side of a hill, and it is a wonder we do not see many more epidemics of disease.

FOREIGN BODIES IN THE NOSE.

BY I. G. SHALLCROSS, M. D., PHILADELPHIA.

The three following cases have been selected to show the variety of articles that are so frequently inserted into the nose, and, also, to show that the symptoms largely depend upon the nature, size, and form of that body :

CASE I.—H. F., a boy of five years, was brought to me, September 25, 1890, with the following symptoms: Nose stopped up; worse on the left side, with a very offensive, thick, flocculent, yellow discharge. He complained of nausea and vomiting at times, had occasional attacks of epistaxis, and was a mouth-breather. An examination revealed a chronic rhinitis in both nares, and in the left nostril a flat foreign body pressing against the septum, being held in position by the lower turbinated body. No history of the insertion of a foreign body could be obtained from the boy. By means of the nasal forceps, we removed a large, flat pearl button, measuring five-eighths of an inch in diameter; considerable lime concretion was deposited on its sides. It is difficult to understand how this button was inserted into the nostril without great pain, the nose being small, and the button evidently having been in position for a long time.

CASE II.—F. McF., a girl, aged nine years, came to me, March 23, 1891, with the following history: Catarrhal symptoms and discharge; mostly from the right nostril; frequent epistaxis; breath exceedingly offensive. These symptoms had been prominent for several months. Examination revealed a grayish-white mass, filling the anterior portion of the right nostril. Upon grasping this foreign body it broke, and had to be removed in pieces. It proved to be a wad of paper, which had been in position for a

long time. The mucous membrane covering the septum was ulcerated.

CASE III.—E. H., a girl, aged three years, was brought to me January 28, 1891, with the history of a foreign body in the right nares. She had had a very offensive breath, stenosis of the right nares, with constant discharge from that side. Constant soreness on the right side of the nose; worse from touch, with frequent slight epistaxis. Examination showed an irregular bloody body, entirely filling the vestibule of the nose. Touching it slightly with a probe gave pain and started bleeding. It was removed with forceps. Subsequent washing of the foreign body showed it to be a sand burr (Porcelain).

A review of these three cases brings us to the consideration of foreign bodies in the nose in general. Most foreign bodies found in the nose have been placed there intentionally by the patient or some playmate simply for fun. Sometimes the insane or a hysterical female will insert a foreign substance in the nose. A portion of the vomited contents of the stomach is occasionally projected into the post-nares and becomes lodged there; almost always a little hawking will relieve these cases. Other things than partly digested food are sometimes impacted in the post-nasal space. Bosworth reports a deciduous tooth which had remained in the nasal cavity for twenty-five years. Occasionally, in cases of epistaxis, where plugging of the nostril has been resorted to, a tampon has been left in the nose and set up all the disagreeable symptoms of this trouble. Small objects, such as shoe buttons, pebbles, grains of corn, beans, jackstones, etc., are the commonest objects found; such foreign bodies usually lodge in the lower meatus, but occasionally in the middle. Sometimes an object will make its way through the outer wall of the nostril; thus, within the past two months, I saw a case in which a bullet was removed from the left naris, it having penetrated the left ala.

After inserting a foreign substance, a child will become frightened, and, knowing he has done wrong, will even bear pain rather than tell his parents for fear of punishment.

Consequently, the case passes into one of chronic offensive catarrh before the physician sees the child.

The symptoms depend upon the nature of the foreign body. Should it be vegetable, *e. g.*, a dried bean, it will take up moisture and swell, causing severe pain; such articles have even been known to germinate and produce very troublesome symptoms. The symptoms also depend largely upon the size and form of the substance.

Immediately upon the insertion of a foreign body in the nares, nature sets to work to remove it. At first there is a reflex sneezing which, in many cases, dislodges the foreign body; should this not suffice, an acute rhinitis supervenes, with the attending profuse sero-mucous discharge; should the foreign body now be dislodged, aside from having a scare which may prevent a repetition of the offense, our patient is none the worse. Unfortunately the foreign body frequently becomes impacted, and then the case passes into a chronic inflammation; the discharge becomes muco-purulent and often sanguineous, and the breath gradually becomes extremely offensive. Where the substance is large, stenosis results immediately; but even where it is only of moderate size, stenosis often results from the swollen condition of the mucous membrane and the muco-purulent secretions; thus we have mouth-breathing as a symptom. At times an acrid discharge will erode the wing of the nose and the upper lip, especially in children. Facial neuralgia is often an early and distressing symptom. In some cases the salty constituents of the pituitary secretion collect around the foreign body, as in my first case. Should this continue and the foreign body not be removed, we will have the formation of a rhinolith.

In all cases of chronic purulent discharge from the nose, but especially in those where we have a persistent stenosis of one nostril, we should make a thorough examination, having in mind the possibility of the presence of a foreign body. Another thing that may guide us in the diagnosis of a foreign body is the character of the discharge, which is almost always flocculent and cheesy. The ulceration due

to a foreign body is seldom deep; when perforation of the septum results, it is due, more frequently, to the pressure of the foreign body than to the ulceration which it causes. Our diagnosis is never complete until we have made a thorough anterior and posterior rhinoscopic examination. In doing this it facilitates matters much to first cleanse the nostril as well as possible with some solution, either by means of a gentle syringing or, preferably, the spray. After this, a four per cent. solution of cocaine should be sprayed into the nostril; this has the effect of a local anæsthetic and at the same time reduces the hyperæmia and swelling of the mucous membrane. After waiting a few minutes for the action of the cocaine, we can, in most cases, see the foreign body impacted in the lower portion of the nostril. Failing to see it, we can often locate it by gentle manipulation with the nasal probe. In young children it is best to use chloroform as a general anæsthetic, and then, having found a foreign body to be the cause of the trouble, remove it immediately.

As soon as possible, after making a diagnosis, the foreign body should be removed. In children who cannot, or will not, blow the nose vigorously, a pinch of snuff will excite sneezing, and sometimes dislodge the foreign body. This is the simplest and easiest method, but it is not always effective. Sometimes we can dislodge the foreign body by means of the Politzer bag, inflating through the free nostril and allowing the opposite side to remain open. The Gross curette and hook is an exceedingly useful instrument in removing beans, peas, and, the most common of all things, shoe buttons, from the nose. In cases where we find orange seeds, or other like substances, the delicate screw found in the Politzer ear case will prove serviceable.

Sometimes the foreign body can be more easily removed by pushing it into the pharynx. This, however, should be a last resort, as there is great danger of its falling into the larynx. When this procedure becomes necessary, the index finger of the left hand should always be introduced into the post-nares to guide the foreign body in its fall. The douche

I believe to be dangerous and unnecessary. The most useful instrument in removing these foreign bodies is a pair of toothed, nasal forceps; in the majority of cases no other instrument is needed. No fixed rule, however, can be laid down for any of these cases. Sajous reports passing a wire through the nares into the mouth, fixing a piece of linen to it, and then pulling it through the nares, bringing the foreign body with it. The accumulation of calcareous deposit on the foreign body may make it necessary to crush the entire mass, and remove it piecemeal.

THREE APPARENTLY INDEPENDENT AFFECTIONS WHICH FREQUENTLY OWE THEIR ORIGIN TO NASAL STENOSIS.

BY HORACE B. WARE, M. D., SCRANTON, PA.

These affections are (a) *Asthenopia*, (b) *Chronic Enlargement of the Tonsils*, and (c) *Asthma*.

I place asthenopia first, for I think it the most frequently overlooked. The eyes are in direct sympathy with the nose. I have examined many retinae during acute rhinitis, and have found in nearly all cases the retina much inflamed, and, in some instances, the disk so much congested that it was difficult to outline it. In these cases there were always more or less photophobia and painful vision. These symptoms, moreover, pass away with the nasal disorder; at the next ophthalmoscopic examination the fundus has usually shown a normal appearance, although in some the disk has seemed to be paler than normal, caused possibly by the congestion.

Now if an acute inflammation of the nasal passages can cause such marked eye symptoms, the same may be produced when the turbinateds are chronically so congested and swelled that they touch the opposite side of the passage, and, at each inspiration, rub against each other. This is virtually the same condition that exists when the attack is acute.

By removing large nasal hypertrophies, I have succeeded in curing a large per cent. of the cases presenting themselves for relief from troublesome vision, severe headaches,

etc.—symptoms which the patients, of course, attributed to the necessity for glasses.

I make it a rule to examine the nasal passages, if I find only a small degree of error of refraction, and generally find there the cause. Lennox Browne records a case of so-called glaucoma where iridectomy had been advised and performed, without relief to the patient, who was cured when the nasal passages were cleared: a number of similar cases might be mentioned.

Chronic enlargements of the tonsils are, undoubtedly, in a great majority of cases, caused by constricted nasal passages. Someone has given a very good and practical demonstration of this. It is by holding the nose with one hand, allowing only a small amount of air to escape, and with the other feeling the action of the throat at each inspiration.

I have seen a number of tonsils, larger than hickory nuts, disappear entirely after the nasal passages were made free, and without any local treatment whatever, other than what they received through the nose. If only one nostril is closed and the other free, I have generally found an enlarged tonsil on the affected side, while the other was normal in size.

Asthma is very largely due directly to the unconscious effort of nature to fill the lungs. (I do not include in this all forms of spasmodic asthma.) The result of this effort is that nature tires after awhile, and the lungs are not fully inflated at each inspiration; some cells remain collapsed or practically cease to receive air. This can be demonstrated to anyone who has a practical knowledge of the use of the spirometer. Accepting, if you please, that it is a labored effort to breathe through a constricted nasal passage, the natural result is what is commonly termed "mouth-breathing," when the air ceases to go through nature's filtering and heating process, but comes in direct contact with the sensitive pharynx, larynx, and lungs. The temperature of the air is raised several degrees in passing through the nose, as has been shown by repeated experiments; when this change cannot take place, and cold air comes in direct con-

tact with these sensitive organs, it becomes an irritant; particularly when accompanied by all sorts of irritating particles, as is very frequently the case. Thus pharyngitis, laryngitis, and bronchitis are set up, finally becoming chronic and very troublesome to relieve, until the nasal passages are cleared out.

Treatment.—I usually treat the nasal fossæ for two or three weeks with a mild spray, such as Dobell's or Seiler's, to cleanse the mucous membrane; I then apply a solution of iodine and glycerine or nitrate of silver until the inflammation is somewhat reduced. If only soft hypertrophies remain, I thoroughly cauterize them; selecting the worst nasal passage first, and in about a week treat the other side in a similar way. If there are any bony growths, I remove them with nasal drills or burrs, using a dental engine, which I consider far preferable to the old method of sawing, not only to the operator but to the patient as well. By this method the amount of bone to be removed can be gauged exactly, and the operation quickly performed, with very little hemorrhage and without lacerating the surrounding tissues. Before operating I thoroughly anæsthetize the part with a ten per cent. solution of cocaine. This acts so efficiently that patients make little complaint and admit that it is less painful than having a tooth drilled.

THREE CASES OF RETROBULBAR NEURITIS.*

BY CHAS. C. BOYLE, M. D., NEW YORK.

Within a week's time in January I had three cases of what I should call retrobulbar neuritis; they may differ in some ways from the typical type, still from the history and the appearance, I think they belonged under this classification. One was that of a young Italian, who had lost his sight suddenly in left eye while playing billiards. V.=fingers at 2 ft. On examination found the pupil dilated much more than the right, contracting very slightly to the light. Fundus appeared normal, disk may have been a trifle pale, otherwise could not distinguish anything abnormal. There was very marked soreness of that eyeball on pressing the eye backward; complains of the eye feeling very large. Field for white very much contracted, for red entirely lost. R.V.= $\frac{20}{0}$. The sudden loss of the vision, the soreness of the eyeball on pressing it backward, the trouble being unilateral, loss of vision for red, and the absence of anything in the fundus to account for the trouble, made me make a diagnosis of retrobulbar neuritis. The cause I was unable to determine; there was no syphilitic history; drank eight or ten drinks a day, wine, beer, and whisky—being an Italian probably more wine and beer than whisky; he did not appear like a heavy drinker, was a cook; may have been due to sudden check of perspiration. The disease was of only two days' duration when I saw him; he did not return for treatment.

* Read before the Homeopathic Medical Society, State of New York, February 9, 1892.

The second case was that of a young Swedish girl, who, two weeks before my seeing her, suddenly fainted away, and, when she recovered consciousness, could not see with either eye; in a short time the sight of the right eye returned; the left vision remained very dim, but slowly improved, and when I first saw her, two weeks after its occurrence, it was only $\frac{2}{10}$. The ophthalmoscope showed nothing abnormal in fundus, but there was a decided soreness of the eyeball on pressing it backward. Field for white very near normal, but that for red very much contracted and, at some places, seemed entirely lost in the region between macula and disk. Her menses were normal, but she had nose-bleed, and I noticed, on the left side, a spotted appearance as though the fine capillaries were much congested or broken under the skin; complained of a stiffness of that side of face; physician who sent her said her kidneys were all right. From history, I thought it was probably due to a slight hemorrhage into the sheath of the optic nerve of left eye, between the chiasm and bulb. I gave patient *Nux vom.*, as she complained of feeling worse in morning. In three days she returned with vision $\frac{2}{10}$ O. S. Field for white trifle larger, but that for red very much improved, very near normal.

The third case is a chronic one. For eight years has noticed that in the left eye the sight was poor; felt like a veil over eye. Now for one year has had considerable pain over left side of head and in eye, aggravated on using the eyes, especially on a dark or stormy day, or at any time when the light was dim. Examination of the fundus showed a slightly bluish-white atrophy of optic nerve with some cupping at upper part of nerve, tension normal. L.V. = $\frac{2}{10}$. Field for white contracted somewhat. Vision for green entirely lost, and the field for red very small; in some parts lost entirely, when looking toward right side. Complained of a spot before the eyes all the time like a veil; this indicated central scotoma.

Although there was no specific history, unless it might be hereditary, I gave her *Kal. iod.* R^{x} ; for one reason because

the pain in head was worse on stormy and dark days. Patient has rheumatism.

On next visit, said the medicine acted like magic on the pain in the head; have had her under observation for three weeks, and still reports that the pain in the head bothers very little, but sight does not improve. I told her that the sight would probably not improve much, but that all I could hope to do was to keep it from growing worse.

A TANNIC ACID CASE.*

BY HORACE F. IVINS, M. D.

During the spring and summer of 1888 I was granted the privilege of studying with Dr. Robert T. Cooper, at the London Homeopathic Hospital, his own peculiar and successful manner of treating ear diseases medicinally, and of watching the results through a number of weeks. I had the pleasure of noting the successful use of several remedies rarely used in such cases by others. Of all these unusual remedies none impressed me more than did tannic acid; and none have given me so much satisfaction, when indicated, as has this valuable one. For my introduction to its internal use, I am indebted to that great student and developer of homeopathic aural therapeutics, Dr. Cooper.

Before proceeding further let me state that I have been best pleased with the use of the remedy in the 2x trituration, one or two one-grain doses daily. Dr. Cooper, however, prefers it in the 12x, and often prescribes it in the form of a nasal snuff instead of internally. Aggravations are apt to follow its frequent repetition and its long continuance.

The following case is reported as a fair index to the usefulness of the remedy, and for the purpose of laying before you some indications for a remedy which deserves greater consideration than it has so far received.

Although its preparation is given in "The American Homeopathic Pharmacopœia" it is not mentioned in "Hering's Guiding Symptoms," "Allen's Hand Book," "Farrington," or "Gentry." I have been able to find but

* Read before the Homeopathic Medical Society of the County of Philadelphia.

few journal notes. Dr. James M. Williamson's "Idiosyncrasy with Regard to Tannic Acid" (*Hahnemannian Monthly*, 1887, p. 61) records a case where there were asthmatic attacks, with patient's aspect half-stupefied, half-anxious. In the London *Lancet*, March 7, 1889, Dr. E. Houzé, of Brussels, advises large doses (15 grs. three times daily) for phthisis, especially with cavities in the lungs, and claims great improvement in appetite, cough, expectoration, and in the auscultation, but not in the percussion sounds.

The note that I made while with Dr. Cooper, reads: "Tannic acid 12x. Nervous deafness, when the brain is more or less dulled. It acts as a tonic to the general system. The drum-membranes are white, anæmic, atonic, relaxed. Noises in the head during deglutition (Mangan. acet.). Stiffness of the jaws, often due to ear troubles. The remedy often causes constipation."

To the preceding aggravation, I would add: sleepiness, a tired, languid feeling; difficult hearing, when tired or worried; and, later, a sensation as though the head needed support from behind.

In the March (1889) *Hahnemannian Monthly*, Dr. Cooper lays great stress upon this symptom of tannic acid: "*Completely deaf to distant sounds.*"

Miss —, thirty-seven years of age, blue eyes, light brown hair, consulted me May 28, 1890. She said she was losing her reason and her memory. I learned from her relatives that she was well educated and that she had formerly been bright and cheerful. Her hearing had been defective for twenty years, but worse recently. There was no pain, but a decided discomfort and nervous depression; lately, her whole head seemed wrong to her, and there were frequent vertical and frontal pains. The right ear had discharged most of the time since scarlet fever, at ten years of age: and it had not ceased a day since she was sixteen. Scrofulous history. Slight visual defect in the left eye, right very poor, diverging since an accident during childhood. Tired easily, at which times she heard less, and the head and mind were worse. Family and individual history of acne and other skin eruptions, but there was no traceable syphilitic condition. Mother died of

phthisis florida, and there was one case of chronic phthisis in the family. Could not, at that time, think; felt stupid; could not read understandingly. Appetite poor; digestion good. Has been for a long time, under great mental and physical strain caused by looking after a house and "cranky invalids."

Examination revealed the presence of a mild, naso-pharyngeal catarrh, with slight nasal hypertrophy. The right membrana tympani was practically gone, the ossicles absent. The discharge was profuse, thin, offensive, and excoriating. The watch could not be heard, and conversation not understood. The left drum-membrane was thick, milky, depressed, and without a cone. Watch was barely heard, but when close could hear conversation. The eustachian tubes were fairly free, but inflation was not followed by improvement.

The suppurating cavity was cleaned with cotton and treated with boric acid, as aids to the internal remedy. Marked improvement followed within a few weeks, but the discharge did not cease, for more than a week at a time, until the following winter, when it stopped for two months, to again appear in a slight degree and with little perceptible odor. Even January 4, 1892, the discharge was present, although in a slight degree. This was the last visit, and the first for almost a year.

At her first visit Miss —— received sulphur 30x. This was followed by slight reaction. At her third visit she complained of lassitude, indifference, and a constant sleepy feeling. These symptoms recalled tannic acid, accordingly it was prescribed. At the next visit she seemed brighter; the prescription was continued. The third visit, after the acid was first given, brought the reply, "I am much less sleepy and can begin to think better." On the 7th of August there was only a perceptible otorrhœa and no abnormal sleepiness. The hearing had improved decidedly and the headache was gone. One dose of the remedy was ordered to be taken, every few days, for three weeks. Miss —— then discontinued her visits until the 19th of November, at which time she was excessively nervous and depressed, the symptoms seeming to indicate aur. mur.; this was prescribed, but the condition grew worse until a return to the tannic acid, after which the patient became again bright. She was not seen again for some months, at which time some of the old annoyances had returned, but were soon dispersed by the use of the tannic acid.

January 4, 1892, Miss ——— reported : “ My full brain-power, in other words, my senses, came back in October. I can now study as well as I ever could, and can do with very little sleep ; my appetite is excellent, and I am very strong, better than I have been for many years. The discharge from my ear is only occasional and never severe.”

This experience has been repeated, in part, a number of times, but the symptoms which always attract my attention are the abnormal sleepiness, the fatigue which follows slight exertion, mental sluggishness, or inability to study, think, or remember, and marked nervous depression. The inability to study is not exactly that which is known as *aproxia* (inability to fix the mind on any one subject) ; but rather an inability to think or study at all, and is not, necessarily, dependent upon a marked intranasal disorder, as is usual with *aproxia*, for which *hydrastis* is a good similar.

In conclusion, let me add that tannic acid is rarely, if ever indicated in ear or head troubles unless there be a sleepy, tired feeling present, indicating a loss of tone. In such cases the remedy acts as a true tonic, giving renewed vigor, increased appetite, brightened perceptions, etc. One characteristic—“key-note,” if you will—is that fatigue, mental or physical, brings with it a dull pain in the organ chiefly affected.

STUDIES OF IRIDOCYCLITIS AND OF ATROPHY
OF THE BULBUS OCULI, WITH COMMENTS
ON DR. EMILE BERGER'S RESEARCHES AND
ANATOMICAL PLATES ON THE ALTERA-
TIONS OF THE OCULAR GLOBE.

BY H. H. CRIPPEN, M. D.

(Continued from p. 93.)

SUPRA-CHOROIDAL SPACE.

The changes in the supra-choroidal space are in such close relation with those of the choroid that their description properly follows here. Berger gives the following:

Exudation.—In the early periods of iridocyclitis pus cells surround the vessels and are disposed in the reticular tissue of the supra-choroidal lamina. Hemorrhages have been observed in some portions. An albuminoid fluid infiltrates the supra-choroidal space. It is only in well-developed iridocyclitis that the exudation is of a sero- or fibrino-purulent nature. Its extent is very irregular.

Generally the anterior portion of the supra-choroidal lamina is most affected, and the first changes are found in that part. Except in a few cases, the gravest alterations are found in the equatorial portion, in atrophy of the bulbus after panophthalmia. In the posterior part of the supra-choroidal space, chiefly near the optic nerve, the changes occur latest and are the least in degree.

Besides exudation, the following alterations occur: The lamellæ of the supra-choroidal membrane, in transverse section, show very thin longitudinal striæ. The nuclei of the endothelial cells are more prominent. Some of the pig-

mented stellate cells change form, appearing round, oval, or spheroidal. Some of the cells contain the pigment reunited in small granules, having a less color than normal. In other parts the pigment is so reduced that it is present over a small extent only, because the pigment granules are transported into the exudation by the current of nutritive fluid. Cells are often seen with two or three nuclei.

Detachment of the ciliary body and of the choroid by exudation or by hemorrhage.—According to the extent of the exudation, the changes in the situation of the *uvea* are more or less considerable. Berger reports a case, relating to atrophy of an eye after panophthalmia, in which the choroid was separated from the sclerotic by an exudation of four millimeters' thickness. In another report, a case of iridocyclitis, a very considerable hemorrhage had taken place outside the supra-choroidal space, causing detachment of the posterior part of the ciliary body and of the choroid, with a separation from the sclera of two to three millimeters. In the same eye were observed cavities in the supra-choroidal space into which the blood had not penetrated, while contiguous cavities were filled. Consequently, it seems that the various parts of this space are not in communication.

Alt has also described a very extensive hemorrhage into the supra-choroidal space. Wedl and Bock have observed a case in which the ciliary body was so largely detached that some of the ciliary processes had taken a direction parallel to the axis of the eye. Iwanoff has found, in a case of irido-cyclitis, a detachment of the choroid by an amorphous exudation, which extended into the supra-choroidal space of the optic nerve and forward to Schlemm's canal. According to Gayet and Masson, large exudations, deposited between the choroid and the sclerotic, may assist in preserving the form of the eyeball in atrophy of the bulbus.

Change into connective tissue. Development of cysts.—In the last stages of iridocyclitis the exudation developed in the supra-choroidal space is transformed into a connective tissue in the form of a thin plexus, placed between the layers of the supra-choroidal lamina and bathed in an albuminoid

fluid. In this development Berger has observed deeply pigmented round cells, besides pigment granules. These cells probably come from the stellate cells.

This neoplastic connective tissue placed in the supra-choroidal space is subsequently transformed into a fibrous tissue similar to that of the sclera. In almost all cases of atrophy of the bulbus, Berger has observed cystoid cavities in these layers of newly formed tissue. The cavities contain a serous or sero-purulent liquid, in which colloid corpuscles are found.

Obliteration of the supra-choroidal space.—Sichel, in 1846, was the first to describe the pseudo-membranes covering the external surface of the choroid, in atrophied eyeballs. Subsequently, fibrous formations situated between the choroid and the sclerotic were described by Iwanoff, Knapp, and Hirschberg. According to Berger, obliteration by these neoplastic membranes never extends to the whole extent of the supra-choroidal space. In the majority of cases they are situated in the anterior part of the supra-choroidal space. In later stages, deposits of lime appear in the neoplastic fibrous layers.

Although the relations which exist between these pseudo-membranes and the changes of the choroid were mentioned by the older authors (Pagenstecher and Genth), the merit of an exact statement belongs to Goldzieher. It is beyond doubt that, in certain cases, the detachment of the choroid is produced by the retraction caused by cicatricial changes in the exudation. The opinion of Braily and Lobo, that "this formation is produced by the thickening of the supra-choroidal membrane," is evidently a mistake.

POSTERIOR CHAMBER.

The first alterations in the posterior chamber, in a case of iridocyclitis, consist in the presence of a sero-purulent exudation and, subsequently, a fibrino-purulent. The anatomical relations are unchanged in the beginning. Fig. 15 presents, in transverse section, the prolongations of the posterior chamber filled with sero-purulent exudation. An

early change is the deposit of an exudation between the vitreous and the zonule and between the vitreous and the posterior part of the capsule. From this results the formation of a post-zonular space (Petit's canal) and a post-lenticular space. According to Iwanoff, the formation of these two spaces is a partial symptom of anterior detachment of the vitreous, but exudation alone, without a simultaneous retraction of the tissue of the vitreous, cannot explain the production of detachment.

Hydropsy.—In the early stages of irido-cyclitis, adhesions of the pupillary margin to the capsule of the lens often

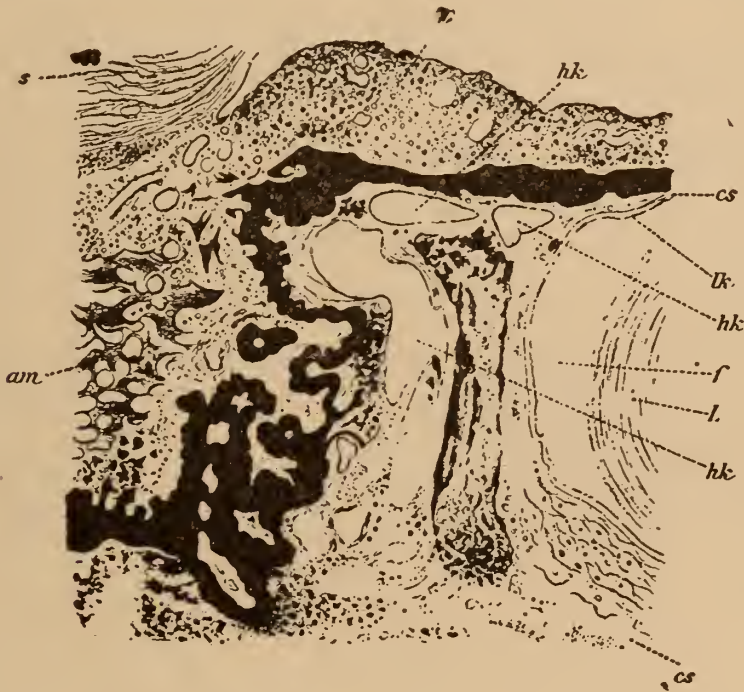


FIG. 22.—Meridional section of the peripheral portion of the posterior chamber in a case of iridocyclitis. Magnified 130/1.

hk. Remains of the posterior chamber.

f. Serous fluid between the capsule and the cortical part of the lens.

occur. In this way, the liquid of the posterior chamber is massed behind the iris, and pushes it forward; thus occurs hydropsy of the posterior chamber (Schiess-Gemuseus, Pagenstecher and Genth). If the elasticity of the different parts of the iris be unequal, its anterior surface will appear uneven.

Remains of the posterior chamber.—In more advanced

iridocyclitis, the neoplastic layers serve as links between the posterior surface of the iris and the anterior part of the capsule. Layers of exudation are even found in other parts of the posterior chamber. But in these portions, remains of the structure of the posterior chamber can also

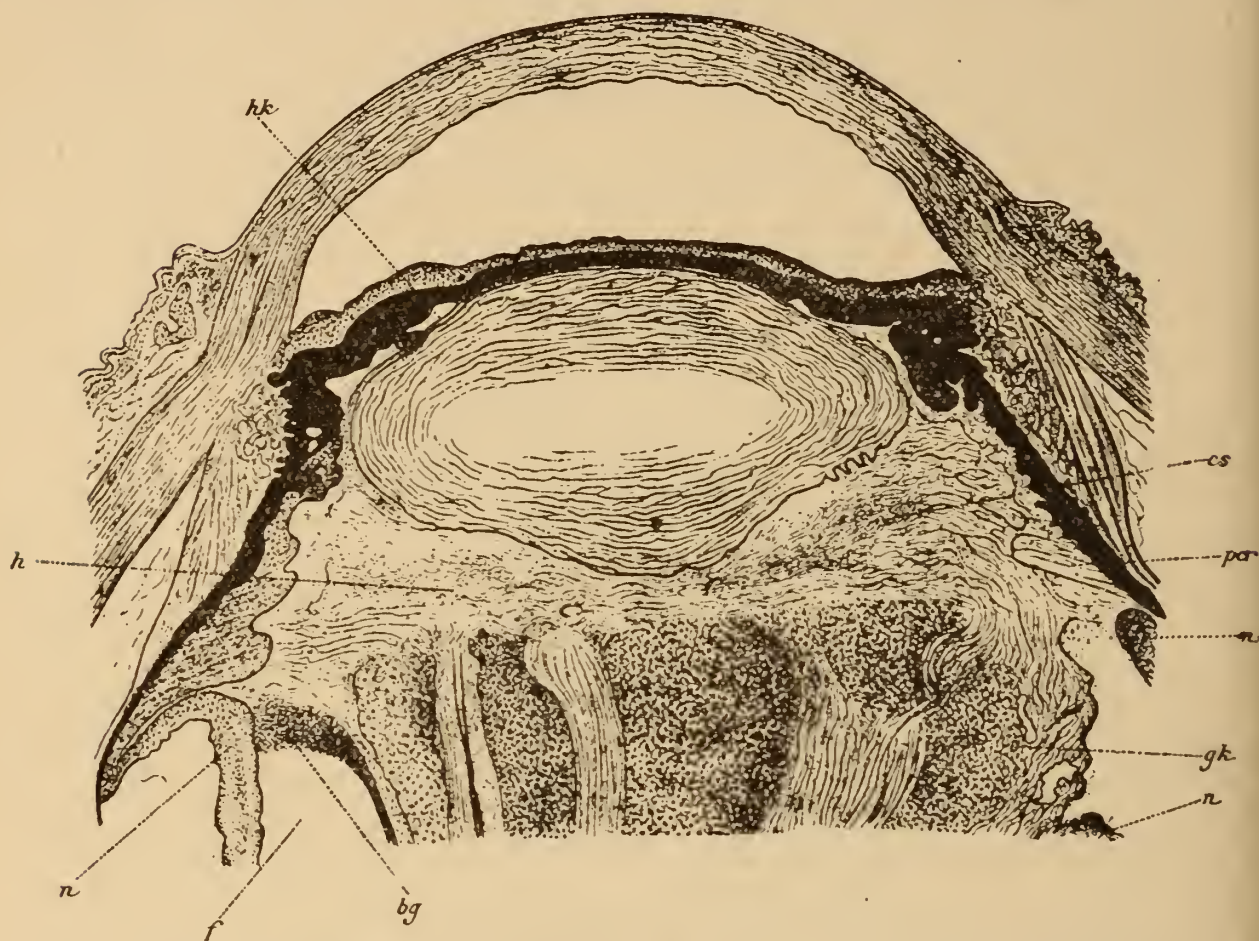


FIG. 23.—Anterior portion of an eye in an advanced stage of iridocyclitis. Magnified 8/1.

f. Cavity filled with serum, between the vitreous and the detached retina.

bg. Hemorrhagic exudation on the external surface of the vitreous.

be demonstrated. Such remains are represented by Berger in Fig. 22. They contain an albuminoid liquid, and are covered by endothelial cells. In cyclitic eyes (Fig. 23) and in atrophied eyes (Fig. 15) small fissures, (*hk*) are sometimes found situated between the peripheral part of the iris and the ciliary processes.

Deposits of lime salts and ossification.—Deposits of cal-

careous salts in these cyclitic exudations is a very frequent occurrence; ossification is comparatively rare. Berger reports three cases in which osseous tissue was found in the posterior chamber of atrophied eyeballs. In all these cases, the osseous tissue was found immediately behind the posterior surface of the iris. Hirschberg, Goldzieher, and Wedl and Bock, have described ossification situated around the crystalline in atrophy of the bulbus.

Retention of lymphoid liquid; development of cysts.—Sometimes the layers of cyclitic exudation contain lacunæ of irregular form, which are filled with albuminoid liquid in



FIG. 24.—Cyst produced by mucoid degeneration of the vitreous. Magnified 300/1.

er. Cystic cavity.

b. Vitreous degenerated into a fibrous tissue.

a, d.—Small cavities.

which float lymph cells. These cystoid cavities have been described by Wedl and Bock, without explanation. According to Berger these lacunæ are produced by the retention of the lymphatic fluid. In an atrophied bulbus, the same author has observed, in the layer of exudation, irregularly limited cavities, traversed by very fine fibrillæ. These cavities, he believes, are produced by mucous degeneration. Similar cavities were found at the same time in a fibrous cataract (Fig. 12, *e*), in the vitreous (Fig. 24. *er*) and in the retina.

Zonule of Zinn.—In iridocyclitis, with the appearance of an exudation filling the posterior chamber, the fibrillar fas-

ciculæ of the zonule are separated by the interposition of pus cells. In the large zonular fibers, fine longitudinal striæ appear, in meridional section, showing that they are composed of extremely fine fibrillæ. In atrophy of the bulbus, Berger has always been able to demonstrate remains of the zonule, in which the fibers have thickened and taken a homogeneous and vitreous aspect. During the process of proliferation from the ciliary body, the zonular fibers undergo considerable alteration in situation and in their relations from the development of fibrous masses and neoplastic vessels within the zonule. In cases where the crystalline lens is preserved, the anterior and posterior walls of

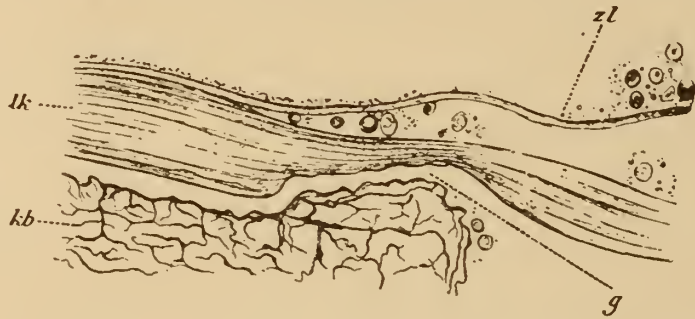


FIG. 25.—Oblique section from the anterior capsule of an atrophied bulbus. Magnified 520/1.

zl. Zonular lamella from the anterior surface of the capsule.

g. Fossa in the posterior surface of the anterior half of the capsule, produced by the encroachment of calcareous deposits.

Hannover's canal are generally recognizable, but the canal is filled with neoplastic fibrous tissue or its walls are in apposition.

Endothelium of the posterior chamber.—In iridocyclitis the endothelial cells are fusiform and contain pigment granules in their protoplasm. In the terminal part of the zonular fibers the cells become attached, on one side to the zonular fibers, on the other to the lamina vitrea. In two cases, Berger found hemispherical colloid excrescences on the internal surface of the lamina vitrea of the pars ciliaris retina. From the analogy with colloid excrescences on other anhistous membranes (Descemet's membrane, elastic membrane of the choroid) it may be supposed that they are produced by colloid degeneration of the endothelial cells of the posterior

chamber. Schwalbe has described small scintillating corpuscles, without color, which cover the zonule in pigs' eyes. Perhaps these bodies are also of a colloid nature.

CAPSULE OF THE LENS.

Division into lamellæ.—Berger's proof of the lamellar construction of the capsule seems beyond doubt, for Schwalbe accepts his description of this structure in De Wecker and Landolt's great work (*Traité Complet d'Ophthalmologie*, in 4 vols.), and Becker and Fuchs have demonstrated this lamellar constitution in pathological preparations. Fuchs

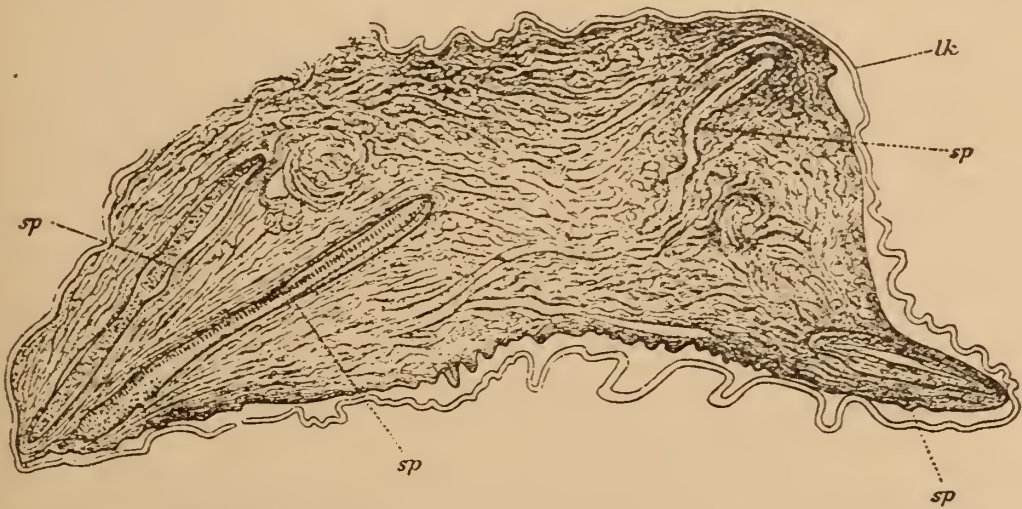


FIG. 26.—Meridional section of a fibrous cataract from an atrophied bulbus. Magnified 60/1.

sp. Fissures containing normal lens fibers.

has observed, in iridocyclitis, that the capsule of the lens splits into two or three lamellæ, and has found that pus cells from the exudation surround the crystalline, penetrating into the spaces situated between the lamellæ. According to Berger, in iridocyclitis and in atrophy of the bulbus, it is possible to note all the transformations of the capsule, commencing by longitudinal fissures and terminating in division into separate lamellæ, the number of which is greater in an atrophied eyeball. In atrophy of the bulbus, the same author has often observed the separation of a thin plate from external surface of the capsule (Fig. 28, *zl*), or the same phenomenon at the inner surface.

Deposit of calcareous salts in the capsule.—In atrophy of

the bulbus diffuse calcareous deposits are frequently found in the capsule. Müller has made extensive researches on this subject. But since Becker has thrown some doubt on this matter, it is well to note that Berger corroborates Müller's assertions by stating that he has observed concretions of lime salts situated between the lamellæ of the capsule.

CRYSTALLINE LENS.

In iridocyclitis, the lens may be subject to very remarkable alterations of form and situation. In the early stages

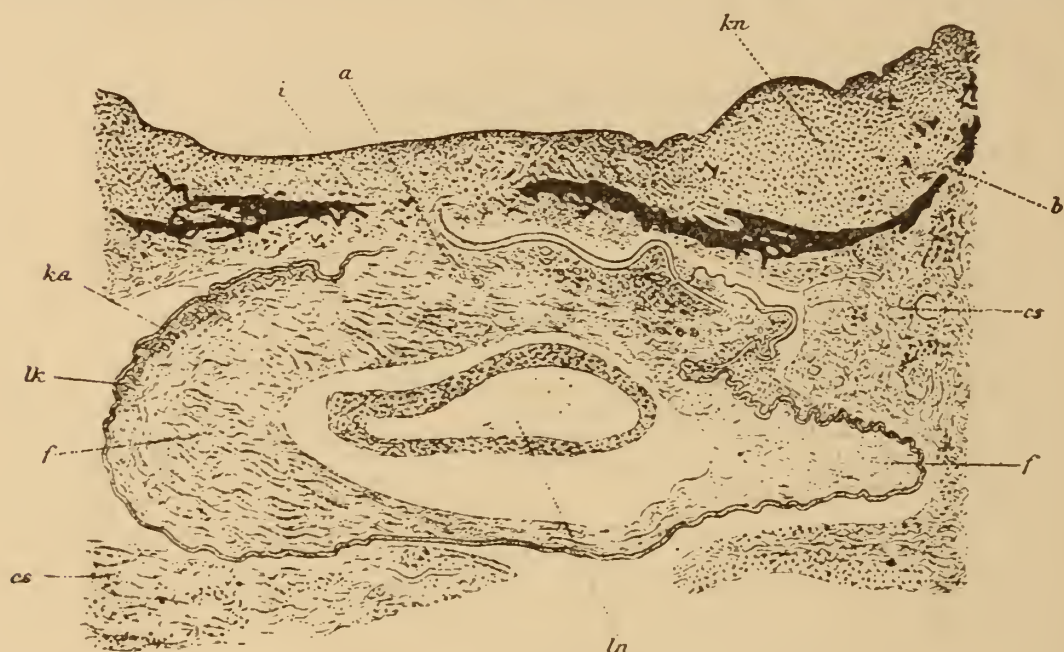


FIG. 27.—Meridional section from a fibrous cataract. Magnified 80/1.

a. Open portion of the capsular sac.

f. Peripheral fibrous part.

ka. Calcification.

ln. Nucleus.

it is pushed forward, but retires again in proportion as the depth of the anterior chamber increases. In atrophy of the bulbus, in most cases, the anterior chamber is found very shallow, consequently the crystalline is found advanced a second time. The form of the crystalline is modified in part by its swelling, and in part by cicatricial retraction of the cyclitic exudation. Some very strange forms are assumed by the lens in atrophy of the bulbus (Figs. 26 and 27, from Berger) and yet there are instances where it preserves

almost its perfect form (Figs. 28 and 12, from Berger). In atrophy following panophthalmia Berger has never found a whole lens, but only its remains; and in one case the remains of the lenticular fibers were transformed into vesicular cells (Fig. 29) inclosed within the folds of the capsule.

Changes in the contents of the capsular sac.—Berger divides the alterations which develop, in iridocyclitis, in the contents of the crystalline, into three periods.

In the first period (if the capsule remains intact), the intra-capsular cells are so transformed as to resemble soft



FIG. 28.—Fibrous cataract. Magnified 60/1.

- a. Calcified fibrous periphery.
- b. Fibrous masses not calcified.
- f. Cavity containing vessels.
- U. Limiting calcareous part.
- g. Small cavity.

cataract. In the second period, the pus cells penetrate into the already ruptured capsular sac and produce fibrous cataract by their organization. In the third period, is observed regressive metamorphosis of the fibrous cataract, calcification, mucous degeneration, and development of cysts or of osseous tissue.

Soft cataract.—When the contents of the lens are trans-

formed into a soft cataract the following is noted: The posterior surface of the anterior half of the capsule is covered by a capsular cataract. Behind this capsular cataract is found a thick layer of liquid and the lenticular fibers, separated by fissures filled with an albuminoid liquid. The lenticular fibers are much swollen, and contain vacuoles and a large spheroidal nucleus. Some of these fibers are undergoing decomposition. The vortex of the lens is not recognizable. The posterior half of the capsule is covered by a neoplastic endothelium. In some portions the lens fibers are broken, their mass is coagulated and composed of small

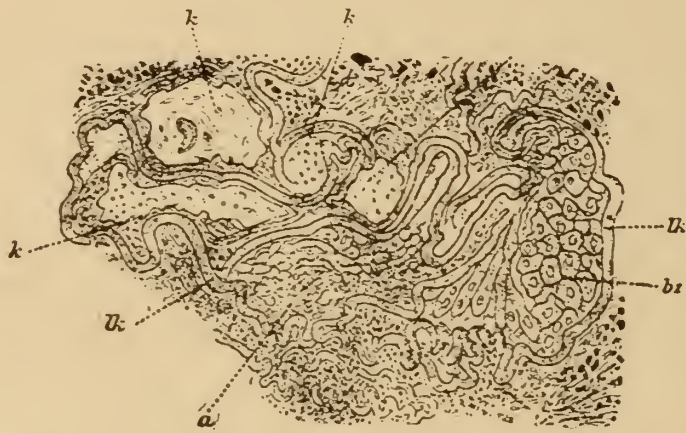


FIG. 29.—Meridional section through a cyclitic exudation behind the iris. Magnified 80/1.

bz. Lens fibers.

a. Débris of the lens fibers.

k. Ossification of an exudation between the folds of the capsule.

granules, highly refractive, which arrest the light and cause opacity of the crystalline.

Fibrous cataract.—While the immigrated cells are transformed into connective tissue, neoplastic vessels penetrate into the capsule through openings spontaneously produced or through a wound. In reality the contents of the capsular sac present in this state a layer of cyclitic exudation within the capsule. Such a fibrous cataract may, in atrophy of the bulbus, inclose some normal lens fibers (Fig. 26) or even the nucleus (Fig. 27). With degeneration in fibrous cataract, the deposit of calcareous salts is a frequent occurrence. Berger presents a remarkable case, where very numerous

vessels were developed in a fibro-calcareous cataract. The capsule is well preserved in this preparation (Fig. 28). The external contour (*a*) of the cataract is calcified, the fibrous masses within (*b*) present a spongy structure formed by beginning mucous degeneration. Lime salts are also found in the fibrous mass in the form of finer granules. Posteriorly is observed an elliptical cavity (*f*), its wall (*u*) presenting a diffuse calcification. Near the capsule will be noted an irregular cyst (*g*). In the fibrous masses the vessels are so numerous that Berger calls this a vascular cataract.

Osseous cataract.—Both Berger and Becker believe that osseous cataract is never found unless the capsule has been opened, and the former particularly attributes the ossifica-



FIG. 30.—Formation of connective tissue in the interior of the capsular sac, consecutive to a wound (Alt).

tion to a change in the connective tissue of a fibrous cataract. The formation of connective tissue, consecutive to a wound of the capsule, is well presented in Fig. 30, from Alt, and the subsequent ossification is represented, by the same author, in Fig. 31. Dr. Wecker is also of the opinion that ossification within the capsular sac only occurs when the capsule has been opened.

Development of cysts.—According to Berger, the development of a central cavity produced by mucoid degeneration is very frequent. The center of this cavity is filled by a mucous mass, by colloid corpuscles, and by granules of lime salts. These cavities are well represented by Berger in Fig. 12. Behind a large cavity (*f*) is seen a connective-tissue structure in which are two small cysts to the left, and

a larger cyst on the right side (*a*). Around these are numerous small cysts of irregular form. Without doubt, the large cysts are produced by the union of several small cysts, and the fibrous fasciculi are the remains of the walls that separated them. Similar cysts are also found in layers of cyclitic exudation, situated behind the crystalline and in the vitreous body (Fig. 24), degenerated into connective tissue.

Deposits of calcareous salts are frequently noted in fibrous cataracts, chiefly in the periphery. The deposits of lime salts appear first in the interstices of the tissue and subsequently in the fibers themselves, that is the calcareous

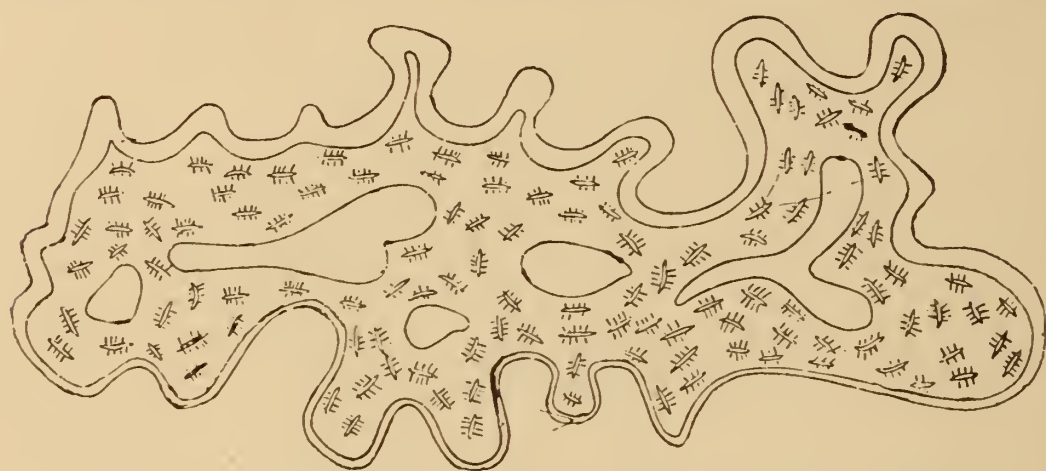


FIG. 31.—Formation of bone in the crystalline lens.

incrustation of the lens occupies the softened external cortical layers in preference to the nuclear and the sclerosed perinuclear portions, developing thus a calcareous shell.

VITREOUS HUMOR.

The first changes in the vitreous, in iridocyclitis, are of particular interest, in consequence of the explanation they afford of the structure of this body. When the vitreous is infiltrated with pus cells, their distribution in its structure merits particular attention, as this distribution will afford evidence for the solution of the question, whether the periphery of the vitreous humor is composed of lamellæ or whether the lamellæ are artificial, resulting from the action of the hardening fluids. According to Berger's prepara-

tions (Fig. 32) the pus cells are arranged near the internal limiting membrane, either parallel to the surface of the



FIG. 32.—Meridional section of the posterior portion of the vitreous, in the beginning of an iridocyclitis. Magnified 200/1.

li. Internal limiting membrane detached by exudation.

h. Liquid between the vitreous and the internal limiting membrane.

vitreous or in a radial direction. Similar observations have been made by Duke Charles of Bavaria.

Cells of the vitreous humor.—In Fig. 17, Berger presents a preparation of the posterior portion of the nucleus of the

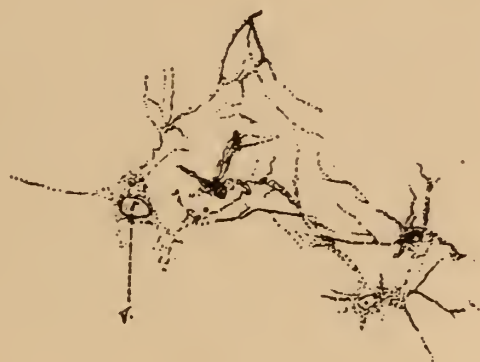


FIG. 33.—Cells of the posterior part of the vitreous in the beginning of iridocyclitis. Magnified 520/1.

v. Vacuole in the protoplasm.

vitreous humor, from an eye enucleated after irido-cyclitis. Extremely fine fibrillæ are observed forming a plexus, in the intersections of which are large spheroidal nuclei, surrounded by protoplasm and containing nucleoli. In the lower part of the preparation is a cavity traversed by a fasciculus of connective tissue (*bf*) which Berger considers

as the remains of an embryonic vessel of the vitreous. Around the cavity, the fibrillæ are united in a plexus (*e*); in other parts (*l*) they have a lamellar structure. Under a



FIG. 34.—Section from the posterior part of the vitreous body of the same eye. Magnified 200/1.

bf. Fibrillæ of connective tissue passing over a cavity beneath the section.

n. Plexus of small fibrillæ.

higher magnifying power (Fig. 33), these cells present prolongations which ramify several times.

It is difficult to ascertain the relations which exist between these cell prolongations and the fine fibrillar plexus



FIG. 35.—Connective tissue from the vitreous. Magnified 470/1.

Section taken in an advanced period of iridocyclitis.

that is present; that is, whether the prolongations are simply crossed by the fibrillar plexus, or whether the branched cells constitute a part of the plexus. It is certain, however, that

these cells have no relation to the transformation of the vitreous into connective tissue, as will be seen by comparing Fig. 34 with Fig. 35. Berger considers the fine fibrillar plexus represented in Fig. 34 as the remains of the primordial intercellular substance, while Fig. 35 shows the connective tissue in a case of fibrous transformation of the vitreous humor.

There is considerable discussion on this subject of the cells of the vitreous, as to whether they communicate directly with each other, or whether the communication is indirect by means of a fibrillar plexus, or finally, whether no communication exists. Virchow has described cells forming an areolar plexus on the surface of the vitreous, and has also found stellate cells in the embryonic vitreous. According to Weber, the cells of the vitreous are united by anastomoses. Coccia arrives at the result, "that the vitreous is composed of a liquid and of a membranous interlacing." The membranes of the plexus are composed of epithelial cells and free nuclei. Ritter finds neither membranes nor cells in the vitreous body. K  lliker has described stellate cells united by a protoplasmic plexus, but these are found only on the hyaloid membrane. Iwanoff has observed three forms of cells in the vitreous : 1. Spheroidal cells situated beneath the hyaloid membrane. 2. Stellate and fusiform cells with two or three nuclei. 3. Cells containing vacuoles. In the horse, Iwanoff has found these stellate cells with colossal dimensions in pathological cases. He has only rarely observed anastomoses between the cells in a pathological state, and never in normal eyes.

Development of pus in the vitreous humor.—The study of this subject appears in as much confusion as many other of the relations of the vitreous, for numerous contradictory reports are met with.

According to Coccia the pus develops from the epithelial cells in the vitreous ; Weber also believes that it is produced by the proliferation of the cells of the vitreous. Haensell and Heitzmann are of like opinion. Berlin finds no alteration in the cells of the vitreous, indicating the development of pus, but in a case of later report he says, "I have not found pus in the retina, although

the contiguous layer of the vitreous presents a great number of large cells containing several nuclei."

The development of pus from the blood vessels contiguous to the vitreous is claimed by Pagenstecher and Duke Charles of Bavaria.

Schmidt-Rimpler has induced a development of pus in the vitreous by the injection of pus from blenorrea of the lachrymal sac, but he does not explain its origin. Wedl and Bock have observed proliferation of the cells of the vitreous in hyalitis.

Berger is in accord with authors who declare for the development of pus from the blood vessels. He has very rarely noted an augmentation of the nuclei in the cells of the vitreous. In some parts of the vitreous, this author has found pus cells within the protoplasm of the cells of the vitreous. Such appearances seem to be explained only by the development of pus from the blood vessels.

Cystic appearances in the vitreous humor.—Cystoid cavities are frequently met in the vitreous body of an atrophied bulbus. Berger describes these cysts as developed in three ways: 1. By the enlargement of lymph passages. A case described by Hirschberg, in which the vitreous was grooved by irregular lacunæ, is an excellent example of this variety. Such cysts seem also to arise by dilatation of the lymph channels which surround the blood vessels, when the vitreous has been transformed into a fibrous body. 2. In Fig. 36, this author describes cysts as developed from a hemorrhagic focus. Within a hemorrhage (*hc*) are seen cavities which he regards as developing into a "hemorrhagic cyst." 3. The remaining variety represents the development of cysts by mucoid degeneration, as in Fig. 24. Here the vitreous is presented as a cicatricial mass. The limits and form of the cyst are irregular, and, as indicated before, in discussing the subject of mucoid degeneration of fibrous cataract, it has probably developed by the union of many small cavities.

Ossification of the vitreous humor is of rare occurrence—in fact, it was long denied, until positively demonstrated by Wittich. It has also been reported by Poncet, Ciaccio,

Becker, Pagenstecher, and Genth. Virchow found ossification of the vitreous in the horse, and Hyrtl in the otter, near the optic nerve. Berger reports finding this ossification in two cases during the examination of atrophied human eyeballs. In one of these cases, the vitreous was transformed into an osseous mass, with the exception of a very small portion. Pagenstecher and Genth have observed, behind the lens, in one case, a morsel of bone, the size of a pin's head, pointed posteriorly, and flattened in front. Pos-

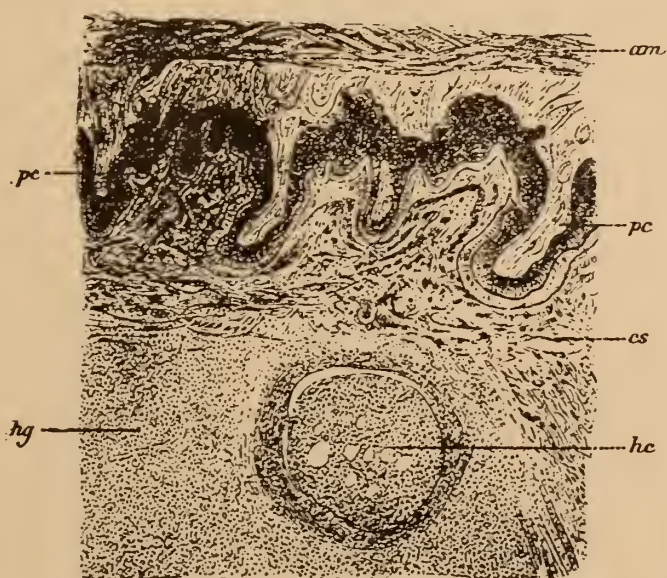


FIG. 36.—Vertical section at the surface of the ciliary body in a case of iridocyclitis. Magnified 60/1.

hg. Extensive hemorrhage into the vitreous.

hc. Beginning destruction of the central part of a hemorrhagic focus.

sibly this may have been a case of total ossification of a shrunken vitreous.

The presence of ossification of the vitreous is explained by Virchow as follows: The primary step is an inflammation of the vitreous; this is followed by transformation into a shrunken fibrous mass. From this the osseous tissue develops. Fig. 37 relates to a case reported by Poncet, from De Wecker's clinic, and is a clear demonstration of the existence of ossification of the vitreous. The osteoma presents a thin layer (1) developed in fibrous tissue of new formation. The fiber layer of the retina (2) is clearly

limited from the osseous tissue by the hyaloid membrane (3).

Alterations in the situation and in the form of the vitreous.—According to Berger, *anterior detachment* of the vitreous humor always accompanies iridocyclitis; posterior detachment is more rare. Miller found detachment of the vitreous in 43 out of 345 eyes that he enucleated. Pagenstecher has noted the frequency of anterior detachment in iridocyclitis, and in glaucoma. In iridocyclitis, small cavities filled with serum are frequently found between the vitreous and the internal limiting membrane of the retina (Fig. 32,



FIG. 37.—Formation of bone in the vitreous.

h). If anterior and posterior detachment occur together, the vitreous may be reduced to a membranous disk.

Hyaline degeneration.—Since Haensell has advanced the theory that the glaucomatous processes reside in hyaline degeneration, which progressively invades the cells of all the tissues of the eye, considerable interest will be found in reviewing this subject. The literature of hyaline degeneration of the vitreous is exceedingly scanty; the most valuable communications concerning this change are two in number: one by Haensell, on "The alteration of the vitreous humor in glaucoma" (*Archives d'Ophthalmologie*, t. x., No. 6, p. 518), and the other by Prof. De Vincentiis, on "Hyaline degeneration in an anterior scleral staphyloma with secondary glaucoma" (*Degenerazione ialina in uno stafiloma sclerale*

anterior con glaucoma secundario, *Annali di Ottalmologia*, Anno xvii., Fasc. 4-5, read before the Congress of the Italian Ophthalmological Association, at Naples, 1888). Haensell's work is partly embryological and partly pathological, resulting in the deduction that, after the growth of the hyaline substance in the cells which form the lamellæ of the adult vitreous body, the granular substance disappears, little by little, from the contracted intracellular passages, and is replaced by a liquid which has the same index of refraction. In glaucomatous processes the intracellular passages are completely closed by the condensation of the hyaline substance of the cells, their contents are forced to accumulate between the lamellæ, and, not finding exit, stagnation results with hyaline degeneration and increase of intra-ocular tension.

De Vicentiis' report is purely pathological, relating to the presence in the eye of a hyaline substance, which, though



FIG. 38.—Hyaline degeneration of the eye, after glaucoma. Gross anatomical appearances.

it may be considered in great part as a transformation of a strongly condensed fibrinous exudation, must also be looked on as due to a direct deposit made by the blood vessels and to a protoplasmic metamorphosis. A concomitant feature to be noted is the disappearance of the retina, due probably to necrosis with secondary hyaline degeneration. Figs. 38 and 39 afford but a partial idea of the changes of hyaline degeneration as given by De Vicentiis in the *Annali di Ottalmologia*.

THE RETINA.

Descriptions of retinal alterations in iridocyclitis and in atrophy of the bulbus are so rare that it will be necessary to

follow Berger almost in detail. The well-known pathological alterations, such as cicatricial detachment of the retina, the destruction of the subretinal exudation by fatty degeneration, and the gross lesions of inflammatory œdema, will be

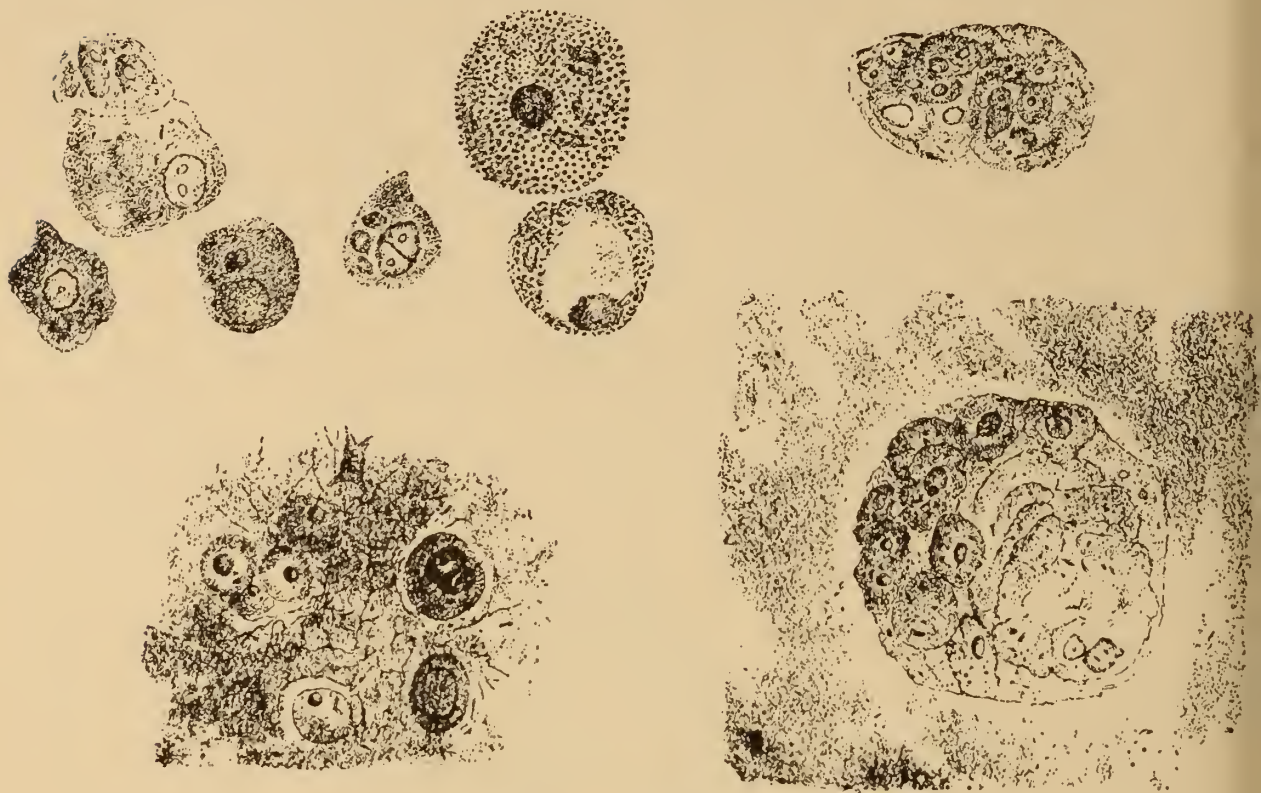


FIG. 39.—Cells from hyaline degeneration of the eye.

set aside to give space for descriptions of more minute character, especially those relating to the rods and cones.

In iridocyclitis the layer of rods and cones is considerably swollen. The internal segments of these bodies are thickened and enlarged, the cones containing a spheroidal globule similar to a nucleus. The external segments of the cones are swollen in piston-like form at their extremity. The rods appear conical. Stoehr, as well as Tartuferi, has observed nuclei in the internal segments of the cones, nuclei which have perhaps penetrated into this layer by displacement from the external nuclear layer. Outside the layer of rods and cones are seen masses of exudation, and *débris* of pigmented cells, detached with the retina; but the greater part of the stratum pigmentosum is still separated from the retina by a thin layer of fibrino-purulent exudation. Near the papilla and at the ora serrata the external segments of the

rods are wholly wanting. The same is true of the greater portion of the cones. The internal segments of the cones cover, by an enlarged base, the external limiting membrane, and present a small number of pigment granules in their external surface. Lymph cells are also found, included between the parts constituting the layer of rods and cones. Klebs was the first to describe a similar hypertrophy of the rods and cones in a staphylomatous eye. In the external segments of the cones Klebs observed a distinct transverse fissure, recalling the effect produced by certain reagents in some animals.

The formation of globules similar to nuclei, as well as the alterations described by Berger in iridocyclitis, has been demonstrated in hemorrhagic glaucoma by Deutschmann.

Besides an hypertrophy, Iwanoff has also described atrophy of



FIG. 40.—Transverse section of the retina at the central part of the eye, in atrophy after iridocyclitis. Detachment of the internal limiting membrane. Magnified 200/1.

the rods and cones in irido-cyclitis. Berlin has observed this atrophy after the penetration of foreign bodies into the vitreous. Berger claims never to have met with atrophy of the layer of rods and cones, but in eyes where this layer has been partially destroyed he has found irregular shrinking to a certain extent of the remains of the rods and cones (Fig. 40).

Among the late changes in the tissue of the retina we find a remarkable proliferation of the two nuclear layers, with shrinking of the two molecular layers, an hypertrophy of the sustaining fibers, transformation of the retina into fibrous tissue, *regeneration of the stratum pigmentosum* (Berger), colloid degeneration, neo-for-

mation and obliteration of vessels, development of cystoid cavities, infiltration by hemorrhages, deposits of lime salts and, finally, the development of osseous tissue. With one exception, there are good descriptions of all these, and there only remains a few words as to ossification.

The development of osseous tissue in the retina is an extremely rare occurrence. Alt has described a case in which the osseous deposit was situated in the most anterior portion of the retina. This author believes that the bony tissue was developed by ossification of colloid corpuscles that invaded the retina. Berger, who reports two cases, believes that the exudation which fills the cystoid cavities, developed in the beginning of irido-cyclitis, has

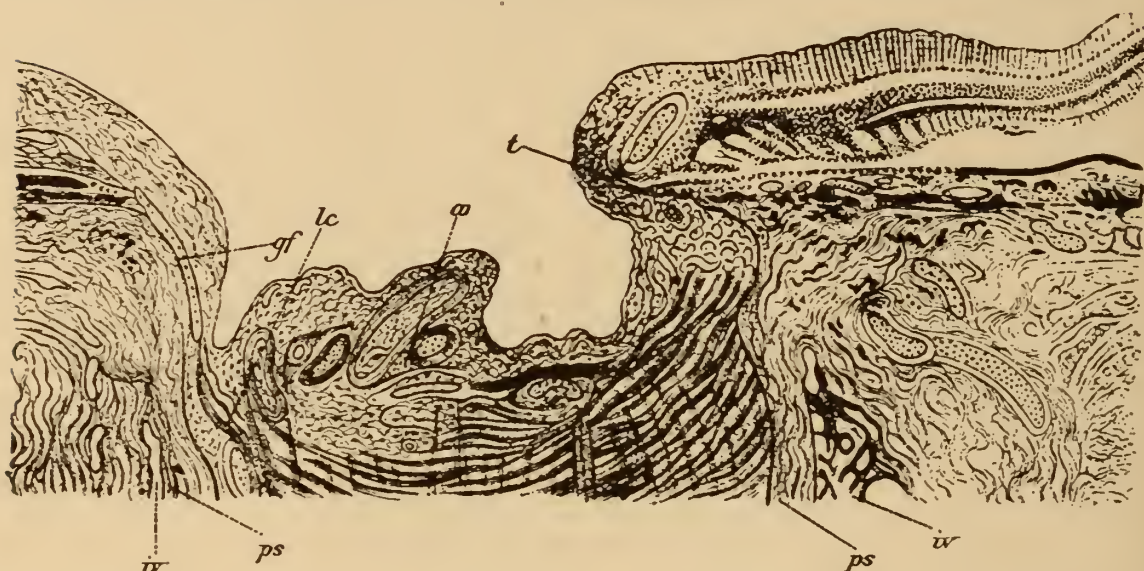


FIG. 41.—Meridional section of the optic papilla, from an eye enucleated for sympathetic ophthalmia. Magnified 50/1.

gf. Vessel on the border of the excavation.

lc. Lamina cribrosa pushed backward.

t. Temporal border.

ar. Areolar tissue containing nerve fibers and pus cells.

been transformed into a fibrous tissue that becomes the origin of ossification. Goldzieher, Schiess-Gemuseus, and a few others have described the formation of bone in the detached retina.

OPTIC NERVE.

Optic neuritis.—According to Berger, inflammatory swelling of the optic papilla is a constant concomitant of irido-cyclitis, as well as of panophthalmia.

Excavation of the optic nerve with optic neuritis.—In an

eye enucleated for sympathetic ophthalmia, Berger has noted a change that has received but little consideration. The iris had been incarcerated in the cornea, and, in consequence, secondary glaucoma with excavation of the optic nerve had occurred (Fig. 41). This excavation, however, seemed complicated by optic neuritis. The lamina cribrosa was considerably pressed backward, and the tissue partly filling the fossa limited by this structure was composed of an areolar mass, and of the fibers of the optic nerve,



FIG. 42.—Longitudinal section of the retrobulbar part of the optic nerve. Magnified 470/1.

es. Endothelial cells, proliferated around the fibrous trabeculæ.

bk. Thickened trabeculæ.

ng. Nerve fibers without myelin sheath.

co. Colloid corpuscle.

separated and thickened in varicose form. The imbibition of the tissue by the transudation of serum also extended into the contiguous portions of the retina. In the vicinity of the vessels, pus corpuscles were also found. The dural and pial sheaths were thickened, and within these sheaths were seen inflammatory foci.

Interstitial neuritis.—In all cases of atrophy of the bulbus, the fibrous plexus of the optic nerve, as well as the

lamina cribrosa, is found in a state of proliferation (Fig. 42). The stellate cells surrounding the trabeculæ of the optic nerve appear increased; their nuclei are very prominent (Leber). In the longitudinal section of Fig. 42, taken from an eye that became atrophied seventeen years before, the endothelial cells are greatly proliferated. These appearances lead us to consider the change in the optic nerve as an interstitial ascending neuritis.

Parenchymatous neuritis may also occur, according to Wedl and Bock. Such cases, however, are very rare.

Colloid masses, in the optic nerve of an atrophied bulbus, were first described by H. Müller. Leber believes that they proceed from the nerve fibers and not from the neuroglia.

Deposits of calcareous salts, in the optic nerve, are said by Berger never to go behind the lamina cribrosa. However, Graefe has reported a case in which the optic nerve was so impregnated by lime salts as to cause great difficulty in dividing it with the scissors during enucleation.

Secondary ascending degeneration of the optic nerve has been observed by Berger in connection with atrophy of the eyeball. He considers this lesion as a perineuritis which extends on the course of the blood vessels from the periphery to the axis of the nerve.

THE CILIARY NERVES.

In view of the various theories as to the origin of sympathetic ophthalmia, some interest will center in the changes to which the ciliary nerves are subjected in irido-cyclitis and in atrophy of the bulbus. Poncet and Cluny have noted inflammatory infiltrations and the formation of exudations accompanied by neo-formation of blood vessels. Goldzieher has also observed hemorrhages around the vessels and in the nerve sheaths. According to Iwanoff and Bolling Pope an augmentation of the nuclei of the nerve sheath is generally found as a consequence of the inflammatory changes.

The inflammatory changes may also present themselves

within the nerve sheaths; pus cells are found between the nerve fibers. In the beginning of iridocyclitis, these fibers were not attacked, but later they appeared relaxed; the myelin substance is rarefied in some parts, and finally it disappears. The axis-cylinders that have lost their myelin sheaths present fusiform thickening (Schiess, Uhthoff), probably caused by the swelling arising from inflammatory transudation. Uhthoff has observed irregular masses composed of fine granules, deposited between the thickened nerve fibers, and Schiess-Gemuseus has observed calcification of the sheaths of the ciliary nerves.

Brailey, Alt, Steinheim, etc., have never found alterations in the ciliary nerves of eyes enucleated on account of sympathetic ophthalmia. Deutschmann, in experimental researches on sympathetic ophthalmia, also found the ciliary nerves in a normal condition. On the other hand inflammatory alterations of these nerves have been found where sympathetic ophthalmia had not occurred, for example in syphilitic iritis (Fuchs). In cases described by Cohn and Goldzieher, where the inflammatory changes were confined to the posterior portion of the eye, these alterations were caused by the compression of inflammatory products, although the ciliary body was intact.

Berger publishes the results of the examination of the ciliary nerves from sixteen eyes; two were atrophied after panophthalmitis; all the others had been enucleated for sympathetic ophthalmia. In these fourteen cases, inflammatory changes were found in the ciliary nerves, within the supra-choroidal space, in nine instances; in five, these changes were absent. According to this author, the inflammatory alterations may also extend backward along the peri-vascular and perineural lymphatic passages in the sclerotic. Inflammatory changes were observed, in some cases, in the narrow canals where the ciliary nerves traverse the most anterior portion of the sclerotic. Masses of pus cells were observed around the vessels which accompany the ciliary nerves to the cornea. The nerve fibers were found thickened in varicose form, in some parts. Pus cells were also found

- between the nerve fibers, which are disposed in fasciculi at the periphery of the cornea. In the two eyes atrophied after panophthalmia (enucleated after death), Berger found no inflammatory changes in the ciliary nerves. These results are somewhat opposed to those of Brailey (Transactions of the Ophthalmological Society of the United Kingdom, 1885), who found the following results, in microscopical examination of the ciliary nerves, in eighty cases of diverse ocular affections: These nerves are sometimes normal in *glaucoma*, but more often symptoms of neuritis and a swelling of the nerve fibers are found; this tumefaction produces marked atrophy of the parts of the sclerotic traversed by the nerves. Seen from within, these portions have the appearance of striæ of a deep blue. In cases of *sympathetic affections*, the ciliary nerves are generally normal, but the sheaths of the arterioles present symptoms of inflammation. The same is present in serous uveitis. Panophthalmia is accompanied by an intense inflammation around the nerves and arterioles. Brailey concludes that the ciliary nerves are frequently attacked in various ocular affections, but that they play no part in the transmission of sympathetic ophthalmia.

In closing this pathological study attention may be drawn to the great similarity of many of the changes occurring in glaucoma to those noted in irido-choroiditis. It is a striking circumstance that both present the same alterations in several instances. Both have œdema of the cornea, inflammatory infiltrations of the tissue of the iris, and sclerosis of its vessels, inflammatory alterations in the ciliary body and in the internal layers of the choroid, and, as nearly as can be judged, similar changes in the retina. In the optic nerve Brailey found inflammatory lesions in glaucoma, and Sattler demonstrated the same in the vitreous body. It is probable, however, that the changes met in glaucoma are of *secondary* nature, produced by the increase of the intra-ocular tension.

Inasmuch as it has been impossible to follow Berger in minute detail on the subjects presented in this paper, so much space having been devoted to comments, we append,

for the benefit of those who wish to take up more profound considerations, the following:

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PERSONAL.—Dr. H. H. Crippen has lately suffered a great misfortune in the death of his wife Charlotte J., at the age of thirty-three. This sad event not only falls with great weight on his home life, but it also comes as a great loss in a professional way. Mrs. Crippen was an expert in the use of the ophthalmoscope and, having an especially gifted hand for miniature painting, was at work, at the time of her death, with her husband on an "Atlas of Congenital Anomalies of the Fundus Oculi." Thus her untimely departure from life entails a great loss to ophthalmological literature.

BOOK REVIEWS.

DEAFNESS AND DISCHARGE FROM THE EAR. The Modern Treatment for the Radical Cure of Deafness, Otorrhœa, Noises in the Head, Vertigo, and Distress in the Ear. By SAMUEL SEXTON, M. D., assisted by ALEXANDER DUANE, M. D. New York : J. K. Vail & Co., 1891.

This is a concise and readable little book of 90 pages, devoted to a description of Dr. Sexton's method of operating for the removal of the membrana tympani and one or more of the ossicles. A short retrospect of work in this branch of aural surgery is given, followed by minute directions for the performance of the modern operation.

The conditions calling for operative interference are carefully described, and a number of cases are cited in which the result of the treatment has seemed to be very favorable. Notwithstanding the opposition of many prominent aurists to this method of procedure it would certainly seem worthy of trial, especially as it is particularly applicable to the very class of cases which are absolutely incurable under all ordinary methods of treatment.—D.

A MANUAL OF DISEASES OF THE NOSE AND THROAT, INCLUDING THE NOSE, NASO-PHARYNX, PHARYNX, AND LARYNX. By PROCTER S. HUTCHINSON, M. R. C. S., Assistant Surgeon to the Hospital for Diseases of the Throat. With illustrations. Philadelphia : P. Blakiston, Son & Co., 1020 Walnut Street, 1891.

"It is with the hope of supplying a useful small book for those who are taking up the post-graduate study of this special branch of medicine," we are told in the preface, "that this work has been written."

The book contains original drawings, some of which are very good, while others are too diagrammatic to give an accurate idea to the student. The various subjects are treated very briefly, though practically. The work, therefore, scarcely appeals to the specialist in diseases of the throat, although even he will find some valuable points of an original nature, and the general practitioner will be amply repaid the time occupied in reading the volume.—I.

THE JOURNAL OF OPHTHALMOLOGY, OTOLOGY AND LARYNGOLOGY.

EDITOR,
CHARLES DEADY, M. D.

ASSOCIATE EDITORS,
H. H. CRIPPEN, M. D.
H. F. IVINS, M. D.

AURAL THERAPEUTICS.*

BY HENRY C. HOUGHTON, M. D., NEW YORK CITY.

At the session of the Institute held in Philadelphia in 1876, I had the honor to present a paper on this subject, in which I gave the results of some observations made during a period of about ten years in the New York Ophthalmic Hospital. The field of observation and clinical trial was an altogether new one in our school, and the results were watched with interest on our part. It sufficed to show that diseases of the ear are no exception to the application of the homeopathic law. Characteristics of old and well-tried remedies hold good, and new indications for old remedies as well as indications for new and untried remedies were noted, with a good degree of assurance as to their correctness.

Since then, a period of fifteen years has given ample opportunity for observation, study, and experiment, and it is a satisfaction to be able to say that, with some few and trifling exceptions, the work reported in a previous paper has stood the test.

Of course, a review from the present standpoint cannot furnish as ample material, but it may prove of interest in regard to a few remedies and some confirmations of the well tried and trusted old-time remedies. There are difficulties due to anatomical reasons, explanatory of the fact

* American Institute, 1892.

that the study of diseases of the ear has not made as great strides as some others, yet, with the present means of observation, we may rest assured that this field of special practice will furnish laurels in the future to every earnest and conscientious student of homeopathic therapeutics.

The following remedies, illustrative of cases, are respectfully submitted for your consideration.

In the list of remedies mentioned as useful in diseases of the external ear, one of the new remedies was picric acid. I quote from page 5 of the report of 1876: "This drug is indicated in furuncular or circumscribed inflamed meatus; and, in the chronic or sub-acute forms it has delighted patients and surgeons. In debilitated cases, with redness and localized tenderness of the meatus, it acts like magic." Afterward, in my use of this remedy, I had occasion to give it in the person of a young woman, suffering from extreme physical debility, in which I was compelled to use *hepar sulphur* as a substitute for the picric acid, or rather, to use the two remedies for limited periods, in order to cover all the symptoms in the case. This suggested the use of a compound, picrate of lime, *calcareo picrata*. I had this prepared by Caswell & Hazard, not knowing that the salt had been prepared by Boericke & Tafel. On applying to them for a higher trituration of the remedy, I was pleased to have a little history of the drug called to my attention, and that limited information has been confirmed by my clinical observations of the effects of this salt. It is true that we do have combined effects of both the *hepar* and picric acid, in an increased degree, so that there is no question as to alternation or substitution. In circumscribed inflammation of the canal it is almost a specific, and in diffuse inflammation (if the infiltration is not as marked as it usually is when *hepar* is used), it is an admirable remedy. The general prostration developed is a collateral symptom worthy of note.

In reviewing the literature, there is nothing to note of remarkable interest as regards diseases of the ear external to the drum-head. In referring to diseases of the middle

ear, baryta muriatica was cited, and attention called to the symptoms as found in Allen's Encyclopedia, which suggested an effect upon the muscular action of the pharynx, eustachian tube, and tensor tympani. The inference that these symptoms were due to the interference with the action of those muscles which open and close the eustachian tube, has been confirmed by repeated observation since then.

On p. 8, we find the following, with reference to capsicum :

“For chronic suppuration, in adults especially. The pains in and around the ear are acute, shooting, pressing, with bursting headache; great thirst with chilliness and shivering. In February, 1872, Dr. T. F. Allen called our attention to this special symptom: ‘On the petrous bone, behind the ear, a swelling painful to the touch.’ In April, 1873, we published in the Ophthalmic Hospital Reports for the *New York Journal of Homeopathy* cases showing its value. Three years have added many cases to our list of cures; the typical ones are those in which acute symptoms occur in chronic cases; the mastoid cells become involved and their dense structure yields slowly; hence, the danger of cerebral trouble as the diploe of the temporal bone above threatens to give way before the petrous portion below and behind. In children the mastoid cells are large and with their walls break down with comparative ease; hepar sulph., calc. hastens the relief when the case has advanced far before capsicum is used. In some cases the swelling behind the auricle has been very great, turning it almost to a right angle with the side of the head, the meatus being closed almost entirely; the pus is yellow, flowing quite freely, and not especially offensive. In every case the M. T. was perforated.”

The above has been confirmed in a large number of cases, and this is one of the instances in which pathogenesis, pure and simple, led to the discovery of a most valuable remedy, and in which clinical experience enabled us to differentiate and determine the class of cases in which it was

effective. This action can be accounted for only on the hypothesis of a local election, and a localized action upon nerves controlling destructive metamorphosis over localized area.

On p. 9 reference is made to *cinchona officinalis*. Here, again, the range of a drug was determined from clinical rather than pathogenetic symptoms.

I quote as follows: "China or cinchona.—Indicated in suppurative inflammation. After repeated trial of the various remedies given in our repertories for hemorrhage from the ear, such as *cicuta*, *lachesis*, *mercurius*, *pulsatilla*, and failing of satisfactory results, we gave china to a little girl at the clinic of the New York Ophthalmic Hospital. The following were the objective symptoms: Meatus full of sanguineous, sanious discharge, the tissues infiltrated and suggestive of deep-seated disease. M. T. not seen; the patient was very anæmic, and the cinchona was given upon general rather than local indications. To our surprise and delight, the case changed its features at once; the meatus became more open, the *membrana tympani* defined, the perforation clearly so, the flow of blood ceased, and the pus became more laudable. Since that date, we have used cinchona in every case of similar nature with a prompt response. The condition of tissue is not that of exuberant granulation, but indolent ulceration, with passive hemorrhage. In one case there was mastoid disease, of long standing; a sinus opened upon carious bone."

Regarding the action of cinchona salts upon the middle ear in non-suppurative diseases, it is a matter of regret that so many cases of toxic effect of the cinchona salts present themselves to the aurist, and we cannot but think that our colleagues are not sufficiently on their guard in the use of sulphate of quinine; certainly, patients come into our hands who have been treated by our colleagues in a most judicious manner in every other respect, but when dealing with so-called malarial disease, without clearly defined phases of periodicity, chill, fever, and sweat, the demands of the patient or the family or the tedious and

prolonged nature of the treatment, has led to the empiric use of sulphate of quinine. Under the use of this drug, the so-called malarial symptoms have disappeared, and the patient has been relieved of that phase of suffering. Later on, subjective symptoms, due to disturbances of the acoustic nerve, and, in some instances, of the middle ear, have been developed. Now, it may be claiming too much to place these things in the relation of cause and effect, but certainly, upon the minds of the patients we very frequently find that such a relation has been impressed. One thing is sure, that the cases of subjective sounds occurring in the person of patients who have been affected by quinine, are almost hopeless. We have been unable to find remedies to antidote the clearly defined pathogenesis of cinchona officinalis and sulphate of quinine. These cases are not amenable to the ordinary mechanical treatment of middle ear diseases, nor are they modified to any great extent by the use of electricity in any of its forms.

Mercurius Dulcis.—On p. 13 of the same article, reference is made to mercurius dulcis as a remedy for so-called catarrh of the eustachian tube, though this term covers only a part of the condition. It is really an *otitis media catarrhalis chronica*, with thickening and closing of the eustachian tube. There is little to add, except that over a period of nearly twenty years this remedy has held its place as curative in the conditions then mentioned. The objective symptoms of the fauces are the symptoms to guide one, thick, smooth, dark red mucous membrane, without the lobulated condition of the tonsils, as indicated by the iodides of this metal.

Psorinum.—This remedy, comparatively new, which has been subjected to undue criticism on account of its origin, merits all the commendation which it has received. In chronic, suppurative inflammation of the middle ear, with a discharge of unhealthy, watery, fetid pus, with vesicular eruption about the meatus or extending upon the cheeks, associated with scabby ulcers behind the ears, or upon the vertex, with excessive itching so that children rub and dig

their ears beyond control, it is a remedy suggestive of a possible experience with *acarus scabiei*. It is good practice to use it as an intercurrent with other constitutional remedies—a single dose at longer intervals.

Tellurium.—Is a remedy which should be more generally known, as it is curative for clearly indicated conditions. Acute or chronic suppuration of the middle ear, with a vesicular condition of the tissues of the canal and drum-head, the exudation being a watery fluid, mixed with pus, smelling like fish pickle, which excoriates the meatus and skin wherever it flows. The first subjective symptoms suggest that its initiation is in the form of a phlyctenular eruption.

Teucrium Marum Verum.—Maintains the claim made for it as curative of mucous accumulations in the tympanum.

This condition is more frequent than had been supposed, and when the following subjective symptoms are observed, it will prove curative: On blowing the nose, a peculiar crackling sound, as if air were forced through mucus, after which the ear seemed closed for a while, and then opened with a dull sound. On passing the hand through the hair, and over the right ear, there followed a hissing sound, extending down the parietal bone and through the whole ear.

A similar sound was afterward caused by talking, and even eructations caused slight or loud sounds; so also forcibly drawing air through the nose in the morning.

It will be seen that these symptoms are similar, in some respects, to those of causticum.

Ferrum Phosphoricum.—This remedy was brought to my attention through the use made of it the New York Ophthalmic Hospital by our late colleague, C. Th. Liebold, M. D. The provings as given in Allen's Encyclopedia have been supplemented by a more exhaustive study, published in the "Transactions of the Homeopathic Medical Society of the State of New York," for 1889, by John L. Moffat, M. D., of Brooklyn, who did the work, as he says, "for the purpose of instituting a systematic proving of a remedy so extensively used, and with such gratifying clinical results as to justify

the attempt to enroll it among our legitimate homeopathic remedies." The claim was made for it in various editions of Schüssler's remedies. The subjective symptoms are sticking pains, buzzing and ringing tinnitus, with deafness; the deafness, commencing with buzzing and ringing, increased in the afternoon, complicated by a pharyngeal catarrh and by vertigo. In the Supplement to Allen's Encyclopedia, the ear symptoms, as given by Dr. Morgan, are less pronounced and deep seated; transient sticking in the right ear, later the sticking as if a large pointed stick were lodged deeply therein, seemed to be subaponeurotic, and this dull feeling was observable even on the fourth day. The general symptoms which lead to its use are the fullness and throbbing of the head and the rise of temperature. The objective appearance of the canal and drum-head are those of the first stage of an acute otitis. The hyperæmia of the periphery of the drum-head and of the manubrial plexus are very marked. Later it extends until the entire drum-head is generally hyperæmic, and would be indicated up to the point of a serous exudation into the tissues; indeed, if the high temperature and rapid, full pulse are guiding symptoms, it should be valuable even if such an exudation takes place. I have seen all these symptoms disappear under its use as if by magic. I have come to use it as a routine remedy for out-door patients at the hospital, and as a prophylactic in cases of earache of children that cannot be seen, or where the symptoms are not clearly reported. The characteristic subjective symptom is the pulsation, and the characteristic objective symptom is the hyperæmia of the drum-head. There is one symptom, or condition rather, which is worthy of note. The fact that paracentesis of the drum-head does not relieve the acute suffering, neuralgic pain,—due to the pressure of engorgement or exudation,—is a very clear indication for the continued use of the remedy. In suppurative otitis, when the exudation is free and well established, we usually find the temperature to fall, the pulse becoming nearly normal. In case, however, of any relapse by contracting colds, the rise of temperature and increase of pulse

will again be readily controlled by substitution of the ferrum phosphoricum, temporarily, in the treatment of the case.

Kali Muriaticum.—The potash salts, introduced by Schüssler, have been so highly indorsed by clinical results, that one should feel warranted in their use even in the face of criticisms to which they may be subjected by those who object to the use of remedies not supported by a clear pathogenesis as the result of exhaustive provings. Certainly kali muriaticum, kali sulphuricum, and kali phosphoricum are entitled to such consideration. The pathological condition for which the kali muriaticum and kali sulphuricum are prescribed, is that of the closure of the eustachian tube as the result of naso-pharyngeal catarrh, and I know of no remedies more effective in overcoming that condition than these same remedies. The objective symptoms are those of a hypertrophic naso-pharyngeal tract, with excessive secretion. The secretion being white, starchy, clear mucus, rather stringy, would indicate the muriate. If yellow and rather more lumpy, kali sulph. in suppurative otitis. These distinctions hold good for the discharge from the tympanum into the external auditory canal.

As the study of otology advances, we are constantly adjusting ourselves to the relations of new facts, hence, many symptoms that were classed as "nervous" are now known to be nervous only in a very secondary sense, and that the causation of these symptoms of the subjective class is due to objective changes in the middle ear. Idiopathic disease of the labyrinth is comparatively rare, yet there may be changes in the terminal branches of the acoustic nerve and changes at its origin, which are analogous to changes in the optic nerve and its distribution, that may give subjective symptoms of various sort as well as diminished function, and it is undoubtedly true that as the pathology is studied, the relation between pathology and well recognized clinical symptoms will be established. Almost every drug in the *Materia Medica* presents subjective ear symptoms in the proving, and, with our present

knowledge, it is next to impossible to separate, and say that such symptoms are due to middle ear disease, such symptoms to internal disease, and such to both. Amyl nitrite certainly produces an effect upon the middle ear and upon the labyrinth, as is suggested by the symptoms in the proving: "Throbbing in the ears. Sensation of a piston working up and down in the ears. Bursting sensation in the ears, as though the membrana tympani of each ear would be forced out with each beat of the heart."

Now, in the clinical application of this remedy, it is found to relieve pulsating tinnitus, in cases in which the hearing, so far as the nerve of special sense is concerned, is up to the standard, that is, the patient can hear the watch $\frac{2}{3}$, but the forcible circulation through labyrinth, brain, and middle ear annoys the patient, because, as one expressed it, they are compelled to hear other sounds through this surging current of the circulation.

Chenopodium Anthelminticum.—The symptoms of chenopodium, as given in Allen's Encyclopedia, are certainly very remarkable both upon the optic and acoustic nerves. The nausea and vertigo, "staggering like a drunken man when walking," are suggestive of the lesion of *otitis interna exudativa serosa*; "deafness to the sound of the voice, but exquisite sensitiveness to the sound of passing carriages; he remarked that as each vehicle rolled by it that it sounded like the roaring of immense cannons right into his ears; also annoying buzzing in ears." Here we notice something which should be very important as an indication. The physiology of hearing is not sufficiently understood to enable us to explain why a person should be deaf to the voice, and yet retain hearing for other than modulated tones. The question arises whether this were due to a peripheral or central lesion. The fact of an associated aphasia would argue for the central lesion. The following symptoms would support this theory: "During all this time, his deafness, as described, was progressive, and became so pronounced as to make it impossible to talk to him. Still there was the same kind of sensitiveness to other sounds; for example, when

the tea bell rang, though he was in the third story, three flights from where the sound came, he, without notice from members of his family, to their utter astonishment, got up and walked as deliberately as ever into the dining room." The sensitiveness to deep tones led me to give this drug in the case of Mr. J., a clergyman, October 26, 1881. He had been extremely sensitive to the rumbling of wheels of carriages, over a period of six or seven years. He was also sensitive to the low tones of the organ, and avoided as much as possible being in the pulpit while voluntaries were being played. *Chenopodium* 4 x relieved this trouble during a period of about two weeks, and that annoyance did not recur again. The patient expresses himself as relieved of a weight upon or tension of the entire upper portion of the head, which had existed during these six or seven years, and which came on suddenly after preaching, associated with a general weary feeling. One patient developed from the second centesimal a sense of heat deep in both ears, with a dull, heavy, frontal headache, with pressure behind the ears for three or four days. This is the only instance in which I have noticed aggravation, but I found the remedy of great value in this condition of sensitiveness to low tones. It should be carefully studied with reference to the relief of deafness to the human voice.

There are two remedies that produce a profound effect upon the labyrinth—sulphate of quinine and salicylate of soda. The sulphate of quinine I have already mentioned as one producing congestion of the middle ear. Sulphate of quinine in 5 or 10 grain doses will produce congestion of the middle ear and drum-head, sufficient to warrant the inference that the intra-tympanic pressure would be modified sufficiently to cause subjective sounds by a simple modification of the pressure at the fenestra. Frequently repeated doses of the sulphate of quinine, of minimum strength, say 1 x, or the first centesimal, will cause similar subjective sounds when no change is apparent in the vessels of the drum-head, and it is begging the question to say that these minute doses are so minute

that it is wrong to infer that the tinnitus was caused by minimum doses, frequently repeated. The primary effect of large doses is to cause congestion ; the secondary effect is to cause anæmia.

Our friends of the dominant school have warned the profession, and Dr. Roosa, who certainly is not an enthusiast as to the specific effects of medicine, has considered the matter of sufficient importance to sound a very pronounced word of warning, and quotes from Kirchner in the following manner: "Quinine causes inflammatory processes and permanent pathological changes in the ear. He believes that the cause for these conditions is to be found not only in a hyperæmia of short duration, but also in the paralysis of the vessels, with congestion and exudation." He also says that Dr. Orme Green, in reviewing the literature of this subject, and giving his own large clinical experience, "quotes my views and their corroboration by Kirchner, with approbation, and states: 'From our present knowledge, both clinical and experimental, we are justified in asserting that the action of quinine upon the ears is to produce congestion of the labyrinth and tympanum, sometimes distinct inflammation, with permanent tissue changes.'"

I have sought with patience for antidotes to the condition, and have tested many homeopathic remedies suggested by my colleagues, but am compelled to say that disturbances of the internal ear, caused by the cinchona salts, are less amenable to treatment than the same symptoms caused by any other condition whatsoever.

Salicylate of soda.—Salicylate of soda causes not only the subjective symptoms of vertigo, nausea, sudden loss of hearing, but a permanent loss of hearing, with tinnitus of low tones as theoretically affecting long vibrations. Physiological experiments on inferior animals show that massive doses cause hemorrhagic exudation in the internal ear. In the minimum doses, $\frac{1}{10}$ – $\frac{1}{100}$, it relieves these secondary symptoms.

Causticum.—The general symptoms of this drug find a counterpart in the aural symptoms, from slight irritation,

causing sympathetic jerkings and contractions, to interference with the special sense. The sensations of dragging, tension, and jerking may be referred to the nerve supply to the middle ear, and are intimately associated with the peculiar symptoms of the hearing. The characteristic symptom, re-echoing of one's own words and steps, has been repeatedly confirmed. We note also a peculiar symptom that the voice seems to come out of the ears rather than from the mouth. This sounds as though a person were speaking in a great cavern, or vault or empty room. Causticum is curative in diplegia. One patient, a fine pianist and acute musical student, gave a very interesting analysis of the relation which the subjective noise bore to the objective tone, as caused by the high vibrations of the piano, telling when the subjective tone was above the objective and when below.

The debate between the anatomists who claim not only a distinct separation between the *portio mollis* and *portio dura*, but a probable division which, it is claimed, can be traced to the origin of the nerves, may be suggestive as to a future explanation of the physiology of the special sense of the auditory nerve. Certainly, no one remedy presents a greater variety of subjective sounds than this, ringing, roaring, rushing, deep thundering tones, with high-pitched tones, as of singing gas flames or insects or whistling of the wind.

As we make such a review as this of the work, over a period of fifteen years, we are quite likely to be impressed with the fact that we are adding material to the *Materia Medica* of the future, and giving occasion to our co-laborers, who are interested in the manufacture of repertories, for additional groans as they struggle with their load, yet the fact remains that many of the new remedies are invaluable in special lines, and we cannot expect in this age of specialties in every department of business, professional and scientific life, to escape the necessity which is forced upon us by the fact that is expressed in the lines regarding the village schoolmaster :

And still the wonder grew,
That one small head could carry all he knew

RATIONAL ANTISEPTIC EYE SURGERY.*

BY HAROLD WILSON, M. D., DETROIT, MICH.

It may fairly be said that the position of antiseptic surgery is established. Its principles are the key to modern surgical practice. The overwhelming majority of operators admit it to be the modulus for their operative work, and those who deny it in words confess it by their deeds, and really practice antiseptic surgery in spite of themselves. If the suppuration of wounds is due to the presence of certain micro-organisms, it is the plain duty of surgeons to keep these micro-organisms out of wound areas, or having them there, to destroy or remove them, if possible. This constitutes antiseptic surgery, and whether it is accomplished by means of an elaborate technique and chemical germicides, or by means of simple procedures and plain hydrant water, the principle is not changed. In either case the motives are essentially the same. It is questionable, however, whether the results are identical. Any clean operation is an antiseptic operation. If antiseptics means anything, it means cleanliness, and, so far as surgery is concerned, cleanliness means antiseptics. For this reason, no one can consistently criticize the foundations of antiseptic surgery, and at the same time insist on cleanliness in operative work. Moreover, it is not logical to declare for *aseptic* as opposed to *antiseptic* surgery, for any procedure, having for its object the removal of micro-organisms from wound areas, is an antiseptic procedure, whether it be active or passive, and whether we employ chemical or mechanical means. Any

* American Institute, 1892.

operator, then, who aims to secure the cleanliness of his instruments, dressings, or patient, practices antiseptic surgery, although it may be of an imperfect sort and he may not admit it himself. The point to be determined is, then, simply what sort of antiseptics is the most rational and the most successful.

Ophthalmic operations are usually attended with small wounds, and although Mr. Tait* finds it difficult to understand why there should not be the same danger of infection from small as from large wounds, the explanation seems to me very simple. The resistance of tissues to bacterial invasion holds good only to a certain point. Whether we accept the humoral theory of Buchner, or the phagocytosis of Metschnikoff it is evident that the healthy tissues can dispose of a certain number of invading micro-organisms, and protect the body against their infection, but that the number of these organisms may be increased to a point where the body can no longer protect itself and general infection occurs. It is similarly true that the amount of local disturbance depends upon the ratio between the resistance of the tissues and the amount of infection; that is, number of bacteria and the amount and character of the toxine. The greater the resistance or immunity and the less the number of bacteria or the quantity of poisonous material they carry with them, the less local or systemic trouble is occasioned by their introduction. The greater danger from large wounds seems to be due, therefore, to the greater opportunities for infection which they offer, and is quite evident, on theoretical, as well as on practical, grounds. General infection may occur, to be sure, from very small punctured wounds, as in cases of tetanus, erysipelas, or septicæmia, but this fact does not invalidate the general proposition that the danger of infection is reduced in proportion to the size of the wound.

There is, then, an element of safety in ophthalmic operations, due to the smallness of the wounds. Another inherent protection is that which the lids afford. They act

* "Diseases of the Ovaries," 1883, p. 270.

as splints to keep the parts in close apposition, and bar the way to the entrance of germs from without, aided somewhat in this by the secretion of tears flowing over the wound areas. From these circumstances, operations upon the eye usually heal kindly, even though only the most meager precautions are taken to make them antiseptic, so that the results of antiseptic ophthalmic surgery do not show any very brilliant advance upon previous methods. In the nature of things they could not. Nevertheless it is commonly agreed that antisepsis, in the general sense in which it is here used, gives results which are enough better to warrant its careful observance. I might, indeed, make it even stronger, and say that in view of the known facts, the conscientious surgeon is under moral obligations to use antiseptic methods in his work.

My present object, then, is, briefly, to study the elements of the problem that has been indicated, and to attempt its solution in a manner that shall be practical, and upon a basis that shall be at least reasonably exact. These elements fall under three heads :

1. The wound area ;
2. The operative technique ;
3. The wound dressing.

The Wound Area.—Ophthalmic operations are made through one or more of the following tissues : 1, lids ; 2, conjunctiva ; 3, cornea.

A bacteriological examination of the skin from any portion of the body will show the presence of bacteria, some of which are often of the pyogenic sort. These are most abundant around the roots of hairs. The brow and lashes are therefore sure to harbor many of them. Smooth skin surfaces may easily be rendered clean, that is, sterile, by the use of soap and water. Hairy or rough surfaces, on the other hand, are very difficult to sterilize. The use of soap and water, gentle scrubbing with a stiff brush, will, however, render them practically clean, if not absolutely sterile. The number of germs left after such ordinary precautions is so small that if the lids, eyebrows, and lashes—particular at-

tention being paid to the edges of the lids—are thus treated to a liberal soap and water disinfection, I am convinced that no untoward results will follow operation in this region, otherwise properly made. This belief is in accord with the universal experience of operators.

There is no valid objection to the use of some fluid germicide, so called, upon these external parts, if the fancy of the surgeon suggest, except the fact that they are of little or no value, and it is, therefore, a waste of time. Belief in chemical antisepsis is based upon the assumption that by the employment of certain substances, bacteria may be destroyed *in situ*. To this end, solutions of corrosive sublimate, from 1-1000 to 1-10000; biniodide of mercury, 1-2000; carbolic acid from 1-20 upward, and boracic acid 1-25 and more dilute, have been particularly popular, and the wound areas have been scrubbed and irrigated with these fluids preparatory to operations, for the purpose of obtaining their germicidal effect upon the micro-organisms in these areas. The bichloride of mercury, the most powerful of ophthalmic antiseptics, used in the ordinary strength, 1-5000, requires three minutes absolute contact with the germs of suppuration to destroy their vitality.* Panas' solution requires two or three days to effect their destruction; carbolic acid 1-40, $\frac{1}{2}$ to 1 minute, and boracic acid has no germicidal action whatever (Sternberg, Weeks). With such a germicide as the bichloride, 1-1000, which destroys the germs in 45 seconds, or carbolic acid, 1-40, either of which may be used on a small skin surface with comparative safety, the destruction of the bacteria *in situ* is entirely possible, providing we can secure their contact for the necessary time. Where the germs are entangled about the roots of hairs, or in other oily situations, they cannot be brought into effective contact with the germicidal fluid unless they are freed from their fatty envelopes. This must be accomplished by the liberal use of soap or ether, and a brush, and by the time the skin and hairs are freed from oil, the bacteria have incidentally been pretty effect-

* Weeks' *Archives of Oph.*, xvi, p. 375.

ually removed, or may be easily washed away. If this is the case, a chemical antiseptic is unnecessary. Furthermore, it is difficult, if not impossible, to secure the perfect contact of a watery fluid with the lids and surrounding tissues, except during the time it is actually flowing over them.

It is well known that the conjunctival sac of the healthy eye contains a variety of micro-organisms, both pyogenic and innocuous. If we attempt to destroy these by germicides it is evident that some substance must be used which does not irritate or otherwise injuriously affect the delicate tissues covering the globe. This requirement will prevent the employment of the bichloride in solutions stronger than 1-400 or 1-500, and cases are on record where the drug has acted injuriously when more dilute than this, although it has, on the other hand, often been used stronger with no ill effects. Carbolic acid 1-40 is very irritating to the conjunctiva, and 1-100 is sufficiently unpleasant. Boracic acid is harmless enough to the eye, but, unfortunately, is equally so to the bacteria. Panas' fluid is irritating even upon the skin, owing to the contained alcohol, and is a very feeble germicide. Chlorine water, when fresh, in full strength, destroys the vitality of the micro-organisms in one and a half minutes, and is only slightly irritating to the eye, but, unless kept tightly corked and in a cool place, loses its germicidal properties very rapidly. Peroxide of hydrogen has about the same properties. But even the most favorable of these substances requires an exposure of two and a half minutes to be effective. For most ophthalmic operations any such exposure is entirely impracticable. Anything less, however, is insufficient, if we rely upon destroying the pyogenic bacteria. We are thus forced to the conclusion that, for the disinfection of wound areas involving the surface of the eyeball, chemical antiseptics is not a practicable possibility with the substances at our present command. To be practically successful would require an antiseptic which would be unirritating and harmless to the tissues of the eye, and instantly destructive to the bacteria with which it came

in contact. On the other hand, it can be shown that the germs contained in the conjunctival sac and upon the surface of a healthy eye may be effectually removed by irrigation. Even if their removal is not absolute, the failure of chemical agents really forces us to rely on mechanical means, whatever their imperfections, to get them out of the way, and there is no doubt that these means are efficacious enough. In short, chemical antisepsis of the conjunctiva and cornea is neither practical nor sufficient, while mechanical antisepsis is easy, logical, and adequate. The parts may be irrigated with any bland and sterile fluid, and a tip should be used by which the cul-de-sac may be thoroughly flushed. My own practice is to use a 75 per cent. solution of common salt in sterilized water, at a temperature of 100° , as the least likely fluid to cause any irritation of the conjunctiva, although, perhaps, plain boiled water might be equally good. In cases of blennorrhœa of the lachrymal passages the method of Pagenstecher may be advantageously followed. This consists in slitting the canaliculus and packing it firmly with an iodoform cotton pledget, which remains until primary union of the wound has taken place. By following this precaution cataract extractions may be made with safety, even in the presence of dacryocystitis. If operations have to be made during the continuance of superficial ocular inflammations such as phlyctenulæ, etc., complete antisepsis is impossible, and irrigation, as above, will probably secure as nearly perfect disinfection as can be obtained by any means.

The Operative Technique.—After the wound area has been properly prepared for an operation, it may be infected by the instruments used. These should, therefore, be made scrupulously clean, that is, sterilized. The importance of this procedure is apparent from the experiments of Knapp* in which disastrous inflammation of the eye almost invariably followed the use of an infected knife or needle. The use of most chemical germicides is here not practicable, owing to the fact that they affect the cutting edge of steel

* *Arch. of Oph.*, xv., p. 24.

instruments. Carbolic acid, 1-20 or 1-40, or salicylic acid 1-1000 will affect sterilization in a few minutes, and, in short exposures, will not effect the instruments unfavorably, but the most thorough and the easiest way of securing absolute cleanliness of the instruments used in an operation, is thermal combined with mechanical disinfection, (Weeks). For polished instruments mere washing with water and wiping with a clean dry cloth is sufficient, but a more safe method is to immerse the instruments, or as much of them as may come in contact with the wound areas, in boiling water, and then to wipe them dry with a soft piece of linen, which need not be sterilized, but simply clean in the ordinary sense. A little pocket stove, or any simple apparatus will suffice for the sterilization, and immersion in the water for one or two seconds is enough, as any germs that are not killed by the heat, or subsequently wiped off upon the cloth, are not at all likely to be transferred to the wound in the act of operating. It is my own habit to sterilize my instruments in this thermo-mechanical way, and then to lay them ready for use in a tray upon a clean dry towel. In addition to the instrumental disinfection, the operator's hands should, of course, be reasonably clean, although I do not think that here anything so elaborate is necessary as obtains in laparotomy. Besides these precautions, the details of the operation itself have an antiseptic bearing. Rapidity lessens the opportunities of infection during the operation, and smooth, accurately made wounds are less prone to suppurative reaction than rough ones, because union is more perfect, and is sooner accomplished.

The Wound Dressing.—In the absence of any experimental data, beyond those of clinical experience affecting the matter of wound-dressing after eye operations, I am compelled here to rely rather upon the results of actual practice. For wounds of the eyeball itself, or those involving the palpebral conjunctiva, the lids form the best possible protection, and it is not of much importance whether the superimposed dressing be strictly aseptic or not, we may close the lids with plaster, or cover them with a cotton

compress and pressure bandage, the results are not materially different. For wounds of the external lid surfaces, dressings that have been sterilized by chemical or thermal antiseptics may be equally appropriate, my own preference being for the latter, as we are then sure not to introduce any disturbing drug effects through the dressing. Whatever be the character of the dressing used, it ought not to be disturbed until primary union has taken place, if possible. After many ophthalmic operations no permanent dressings are applied. Tenotomies, for example, are usually left without a bandage, the flow of tears and the movement of the lids over the wound in winking, being a sufficient protection against secondary infection.

The scheme of antiseptic ophthalmic surgery here briefly outlined, makes no pretense of an absolute antiseptics. The complicated methods introduced by Lister had for their object the entire exclusion of micro-organisms from the wound. This they did not succeed in accomplishing; nor, indeed, is such exclusion a practical possibility. You may multiply complication by complication, until you reach that point where a trifling incision through the skin over a closed auditory meatus occupies an hour and a half of the surgeon's time,* but even then the critical observer will surely find, somewhere, the heel of Achilles—some vulnerable spot through which the whole experiment may be vitiated. For this reason, the most rational antiseptics is one, the purposes of which are possible of realization. Instruments and dressings may be made clean, and if the bacteria cannot be absolutely removed from, or kept out of the field of an operation, they may be so reduced in numbers that they are no longer a menace to the healing of the wound. This is the key note to the plan here proposed. It is entirely feasible and easy to carry out, involves no unwarrantable assumptions, and, so far as experience goes, will be found, I believe, eminently successful. Briefly stated, the method is as follows:

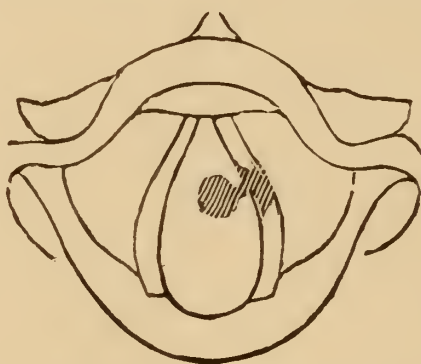
* Lawson Tait, "Disease of the Ovaries," 1883, p. 271.

1. The skin and surrounding parts are well cleaned with soap and water.
2. The eye is thoroughly irrigated with normal salt solution.
3. The instruments are immersed in boiling water for a few seconds, and are then wiped dry with a soft cloth.
4. The operation is made as rapidly and accurately as possible.
5. The wound is irrigated with the salt solution.
6. The wound is dressed with sterilized dressings, preferably those that have been sterilized by heat.
7. If possible, the dressings are not disturbed until primary union has taken place.
8. The patient's general health should receive the utmost attention, both previous to, and after the operation, if it is one of much magnitude.

FIVE CASES OF LARYNGEAL TUMOR.

BY CHAS. E. SPAHR, M. D., LINCOLN, NEB.

CASE I. In April, 1887, Mr. W., aet. forty-four, a school teacher, presented himself at the Vienna Polyclinic on account of hoarseness and occasional lost of voice, which had existed of thirteen months. Since three months has had a troublesome tickling cough, with a sensation at times of something loose in the throat. Has used tobacco all his life, and is fond of his beer and wine. Laryngoscopy reveals a small papillomatous tumor, attached by a broad base, to the left vocal band, at the junction of its middle and anterior thirds. The upper half of the growth was constricted, so as to give it the appearance, at first, of a simple mucous



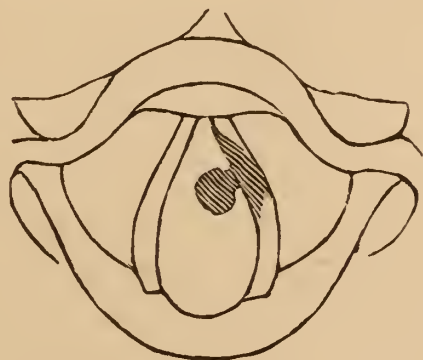
polyp. This little constriction or pedicle was sufficiently long to allow a limited amount of rolling about in the glottis.

With Schrötter's tube forceps the constricted portion was removed at the first attempt. Subsequently, at the same sitting, the remaining portion of the growth was avulsed, after which the hoarseness was replaced by a moderately clear quality of voice.

With examination, two days later, only a slight redness at the former seat of the growth was apparent. A few applications of zinc chloride were made, and at the end of two weeks his natural voice was perfectly restored.

CASE II. Mr. W. H. T., æt. twenty-five, a rag sorter, consulted me June 27, 1889, on account of hoarseness and occasional aphonia, which had existed for nearly five years. At times the harsh quality would give way to a fairly clear tone of voice. And when coughing, since a few months, expectoration is streaked at times with blood.

The laryngoscope shows a good sized mucous polyp springing from the under surface and free border of the left true cord, at



about its middle. An eight per cent. solution of cocaine was freely used in the throat and larynx, after which the tumor was grasped with Schrötter's crushing laryngeal tube forceps, and that portion of the growth attached to the free margin of the cord and spreading slightly over its upper surface was crushed and torn away.

There was left remaining the small portion of tumor on the under surface of the cord, which was too small to grasp. Immediately after the removal of the growth the voice became quite clear. The tumor was slightly constricted at its seat of attachment to the free edge of the cord, but did not have a decided pedicle so as to roll about much in the glottis. This patient was evidently sufficiently satisfied to obtain this much improvement in his voice as, after several visits more, he failed to return to have the cure completed.

CASE III. Mrs. S., æt. forty-five, had been in the hands of physicians of both schools on account of a persistent hoarseness with occasional periods of complete aphonia, which had existed for two years and which was supposed to be the result of a cold. Previous to this time her voice had always been clear, and, on account of her rich soprano voice, she had frequently sung in public.

Examination with the laryngoscope exhibited marked evidences of a chronic laryngitis. The mucous membrane of both

cords was quite thickened and of a dull brownish red color with numerous tortuous vessels. On the free edge of the left cord, a little anterior to its middle, was seated a bright red growth with



broad base, about the size of a sago grain. I diagnosed it as a local hypertrophy of the mucous membrane, and, assuming that during the former treatment it had been frequently treated with astringents, attempted the removal of it with the use of the laryngeal forceps. But I only succeeded in tearing away a small portion of its upper surface, and as the remaining portion was too small to grasp, I began to give insufflations of ZnCl . After six weeks' treatment the cords had lost their dull color and their natural whiteness was beginning to return, in places. The seat of the growth had flattened down, so that it was scarcely discernible. The cords approximated nicely again and the voice had regained so much of its clear qualities in three months that she began moderate singing again with comfort.'

CASE IV. In October, 1887, Miss E., æt. nineteen, a coryphée in the Royal Opera of Vienna, came to the Vienna polyclinic and was placed in my charge for treatment, on account of hoarseness and troublesome cough. She was an alto singer and for several weeks had had great difficulty in singing, and especially in making her middle register notes, with an inability to hold them for any time without breaking. Her high and low notes were fairly good, but lacked volume, and she had less difficulty in sustaining them.

On examination I found a general anæmic condition of the mucous membrane of the throat and larynx. On the left true cord, at about its middle, was a circumscribed red elevation, extending one millimeter out from the free border of the cord, and was about three millimeters at its base. On the right cord

at a point where the growth of the left cord touched it in



phonation was a slight thickening of the mucous membrane, but of a whitish color and apparently of firm consistency.

The diagnosis of corditis nodosum was made, and the application of mild astringents was begun. After several weeks' treatment there was no apparent change in the appearance of the growth; but at intervals during this time the voice would markedly improve, but only to be followed the next day, perhaps, by the same irritable condition.

Prof. Schnitzler took the patient before his class, confirmed my diagnosis, and suggested the same course of treatment I had already given with the above results. At his suggestion I then made an application of *argent. nitricum*, using the unmitigated stick, and applied it carefully to the elevated red spot by means of Störk's protected laryngeal applicator. This was repeated five days later, after the same manner.

Two weeks after application the voice had improved some, the high notes could be reached more easily and surely, but there was a lack of ability to sustain them for any length of time.

A careful examination of both lungs showed no evidence of positive lesion, the chest expansion was good and lung power normal. The respiratory murmur was free from râles. There was very little occasional cough or clearing of the throat and no expectoration. The patient was generally anæmic, the color of the skin closely resembling that of beginning chlorotic subjects. The heart sounds were normal but weak. All local laryngeal treatment was discontinued and a general hygienic and dietetic course of treatment instituted. Absolute rest of the voice was enjoined. Daily cold sea salt baths were begun and the feet bathed in cold water again at night. The entire body was clothed in wool. Cod liver oil and wine were given at meal

times. Plenty of out door exercise, but never to the approach of fatigue. Internally iron, quinine and strychnia were given t. i. d.

In three months the patient had gained twenty pounds. Her color and power of physical endurance were greatly improved, and her voice had almost entirely recovered its original power and clearness. All evidence of local laryngeal infiltration and hyperæmia had disappeared. The patient then removed to the country for several weeks, and on her return to Vienna resumed her singing with satisfaction.

The two principal factors in the production of this laryngeal condition, I think, were, first, a faulty method of using the voice ; and, secondly, a faulty nutrition of the body, toward which improper food and bad surrounding hygiene conduced. The result of the treatment would seem to bear out this reasoning.

I have firm convictions that the so-called abdominal method of breathing is *ex natura*, the best and proper method for singers. A good control of the latent compressive force of the diaphragm is the first secret to discover in the art of singing, which, when acquired, allows the true or natural qualities of the voice to become apparent. Tones produced by a contracted throat, when the full action of the diaphragm is limited by a constricted waist, necessitates an abnormal forced contraction of the constrictor muscles of the larynx, necessitated by the forced contraction of the accessory extra-laryngeal and supra-thoracic muscles and an unnatural approximation of the vocal cords. This, I take it, is artful and not natural singing, and frequently is the cause of the condition which Schnitzler calls chorditis nodosum ; and Dr. Clarence C. Rice, chorditis tuberosa. I want to append Dr. Rice's conclusions, as published in the November number of *Journal of the Respiratory Organs*, 1890, as they are pertinent to the case just cited, and accord with my own views :

“ 1. The condition known as chorditis tuberosa is not one of the pathological changes to be classed among those of chronic catarrhal laryngitis, but is itself the primary lesion.

"2. The presence of the nodule is the direct cause of the catarrhal changes in the larynx, which are developed later.

"3. The condition is almost always found in singers and public speakers, and is caused by a faulty method of using the voice: a callous occasioned by attrition of one band against the other.

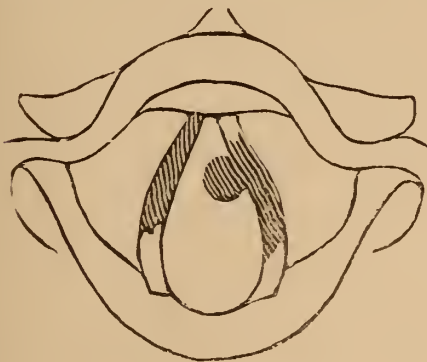
"4. Chorditis tuberosa occurs more frequently in women than men, and is more often seen on the left than on the right side.

"5. A nodular enlargement will, in time, produce a similar change in the second band at the point of contact.

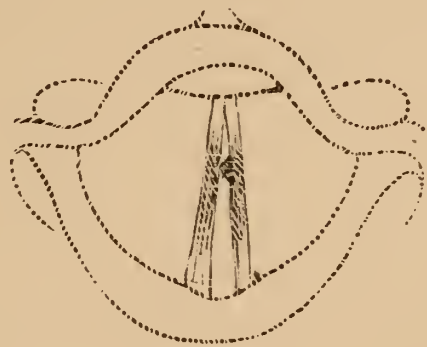
"6. These nodules should be removed as early as possible. Singing should not be allowed until the bands are normal; and faulty methods of using the voice should be proscribed."

CASE V. Mrs. L., æt. thirty-six years, came to my office January 6, 1892, with the following history:

Two years ago had *la grippe*, followed by hoarseness, which has steadily increased, so that now she can scarcely talk above a whisper, and has pain in her throat. Sometimes there is complete loss of voice and breathing is so difficult that she must run out of doors to get air. Examination with the laryngoscope shows a fleshy body covering the anterior half of the right vocal cord and overhanging the free border of the cord about 1 mm.



Inspiration.



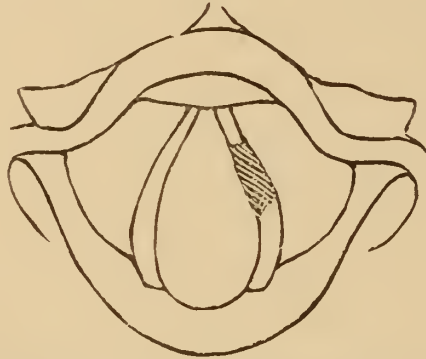
Phonation.

except at the central portion, from which arises a nodular mass the size of a small pea, projecting into the intra-choroidal space. In attempting phonation this projecting body slips beneath the right cord, prevents close approximation of the bands, and

causes pain. The right cord is slightly congested, produced by the friction with its fellow.

Fibroma laryngis was the diagnosis made, and on January 27, the nodular body, which had a slight constriction at its seat of attachment, was surrounded with a cold wire snare and removed. From this time the pain ceased and the voice became clearer. Subsequently a few remaining fragments were torn away by suitable forceps, and then came an interval of seven weeks, during which time nothing was done locally in the larynx on account of another attack of *la grippe*.

When the patient returned several weeks ago there was considerable improvement in the voice and appearance of the left cord, which seemed very much less red but still thickened a good



Appearance of Seat of Growth, May 19, 1892.

deal anteriorly. I am now succeeding in removing this by applying the solid mitigated nitrate of silver by means of a protected applicator, directly to the points of selection on the surface of the growth.

MASSAGE OF THE SOUND-CONDUCTING APPARATUS OF THE EAR BY MEANS OF VIBRATORY FORCE.*

BY HENRY F. GAREY, M. D., BALTIMORE, MD.

Massage of the sound-conducting apparatus of the ear has been used by me experimentally ever since the opening of the clinics at the Southern Homeopathic Medical College, October 8, 1891.

For several years past it has been settled in my mind (theoretically) that if it were practically applied it would prove such an adjunct to the other necessary treatment in those cases of adhesions of the membrani tympani and ankylosis of the ossicles (conditions which it has been almost impossible to change in the past) that, by means of sympathetic vibrations of the diseased parts, the vast majority of such cases could be relieved. It is when deafness is caused by catarrh of the middle ear and eustachian tube that the sound-conducting apparatus is always more or less affected. Independent of the closure of the eustachian tube, which causes a vacuum in the tympanic cavity, preventing vibratory motion of the drum, the transmitting apparatus itself may become incapable of performing its proper functions. I mean, although by treatment the eustachian tube has been rendered pervious, its closure being the primary cause of the drum not responding, the hearing may not improve. And why? Because the other existing causes of the deafness have not been reached. That which is absolutely necessary to good hearing, and toward which we direct all

* American Institute, 1892.

our best efforts, is the proper performance of the functions of the sound-conducting apparatus of the ear. If the *membrani tympani* has been depressed into an abnormal position for some time, on account of the closure of the eustachian tube, changes are necessarily brought about. It loses its elasticity, adhesions take place—caused by secretions of a gluey nature in the tympanic cavity—the joints of the ossicles become curtailed in their movements; and, as these conditions increase, the hearing power becomes less. It is a well known fact that such conditions are the hardest to overcome, notwithstanding the restoration of the eustachian tube to its normal caliber, and there be unimpeded passage for and full use of the air-bag and catheter.

In fact, the usual modes of treatment are very unsatisfactory in comparison with a method which is directed especially upon the parts to be restored, and that is massage. This is a means of treatment which breaks up adhesions, restores the elasticity of the *membrani tympani*, causes mobility of the ossicles, and finally brings the sound-conducting apparatus of the ear into that condition which is absolutely necessary to hearing.

Aurists for some years past, recognizing the great advantages to be derived from a suitable system of massage in the treatment of certain kinds of deafness, have devised various instruments for such use, and, as far as we know, with but little success. Seigel's speculum has been used to draw out the tympanic membrane, with but little, if any success.

To apply massage is to apply force. If our success in the treatment of this class of cases depends upon the mobility of the sound-conducting apparatus of the ear,—and it is conceded that a perfect system of massage would be of inestimable advantage in bringing about that result,—then what force would be more desirable, and could be used to such advantage, in applying a system of massage, than that to which the ear is accustomed, and for which those parts were formed by nature to receive, than vibratory force? Is sound a force? I am of the opinion that it is,

and will give my reasons for this view. In order for the senses to appreciate sound the auditory nerve must receive it in the form of a vibration, but it can exist in our presence without our consciousness of its existence. If this be so, then how can it be explained? In this way: According to experiments made by scientists a note on an instrument can be sounded at such a high pitch in a room full of people that upon some the effect would be such as to almost deafen, while upon others the result would be the complete reign of silence around them. They would hear nothing. The explanation is this. The pitch of a note is determined by the number of its vibrations in a second. The higher the note the greater the number of vibrations.

Now, while the *membrani tympani* and its associate sound-conducting parts in some are sensitive enough to vibrate in unison with an extremely high-pitched sound, others are not. In other words, the range of hearing in some does not reach that of others. They do not hear it because the organ of hearing does not transmit it. Sound is not a sound unless in the form of vibrations. Vibrations are the moving to and fro of a vibrating body. It may be the prongs of a tuning-fork, or the sounding board of a piano, etc. The force which sets the vibrating bodies in motion primarily is different from that which it generates, for the force which a vibrating body communicates to another vibrating body causing it to vibrate in unison, is generated by vibration, and has an identity of its own. This force, as has been demonstrated, can be transmitted through a non-vibratile substance to one which will vibrate, causing a sound.

If it is necessary for the ear to distinguish sounds only by means of vibrations transmitted to the auditory nerve, then the mere fact that we are hearing a noise or musical tone shows that the sound-conducting apparatus of the ear is in motion, in a healthy ear, performing its normal functions. But in a diseased one, which is in a partial state of rigidity, sound in regular vibrations.

introduced into the external auditory canal of sufficient intensity to be heard, means that massage of the sound-conducting apparatus of the ear is taking place. It has been found that different pitched tones are suitable to the different cases, and if the aural disease is accompanied by a tinnitus, I select that tone, as far as I am able, which corresponds in pitch with that produced by the diseased condition. If there is no tinnitus present, a very deep one is selected, followed by others higher, and that one which seems to produce the best immediate effect is used. For these tests each pitch is tried consecutively for five minutes at a time. If there is no immediate improvement with any pitch, a very deep tone is then used. The loudness is varied according to the deafness of the patient and the intensity of the tinnitus; the length of time is from fifteen to twenty minutes continuously.

While speaking of vibrations, I would like to make a suggestion about a test for hearing. It has been noticed by all specialists who treat aural diseases that certain pitched sounds are heard better than others by the partially deaf. For instance, a person may not be hear the watch pressed against the ear, but ordinary conversation is perfectly audible. On the other hand the ticking of the watch is heard perfectly well, while the voice is not. If the hearing is not improved for the voice, notwithstanding other sounds are heard fairly well, we have accomplished very little. For that reason I would suggest a test whose vibrations correspond to the human voice in its medium range. I have now in my mind a small instrument for that purpose, which I think will answer admirably. Of that I will be able to speak with more certainty at some future time.

Massage by means of vibratory force can be used by the aid of the phonograph, and in my hands has produced some marvelous results. In less than thirty treatments, it has caused permanent cessation of the most annoying tinnitus which a great variety of previous treatments had failed to affect at all; and the hearing, which had been reduced to speaking through a tube, was restored in a sufficient degree

to hear ordinary conversation at least fifteen feet away. This treatment has in one application so modified a distressing tinnitus that it ceased to annoy any more, and it increased the hearing power to more than it had been for ten years. It has been found that the class of cases most benefited have been those in which the pharynx and the mucous membrane leading into the tympanic cavity are in a hypertrophic condition; in consequence of which there is partial closure of the eustachian tube. The sensation of a stopped or plugged feeling in the ears is in most cases completely relieved in one treatment. In the other cases where the mucous membrane is in an atrophied and dry condition with eustachian tube easily inflated, the improvement is very slow, and the results not nearly so brilliant as in the former variety; but even in these cases of proliferous catarrh, if there are any adhesions of the membrani tympani complicating the case, there is very much improvement in a few treatments of the symptoms produced by those conditions. I will now give the history, diagnosis, and the results of treatment by this system of massage. No other treatment was given, as it was thought that it would be advisable to see how much those conditions relieved by massage participated in the loss of hearing, which would of course determine the value of massage by means of vibratory force.

CASE I. Charles H., presented himself 20th January, 1892, for treatment. Has been deaf for about ten years. First noticed tinnitus fourteen years ago, and it has been constant ever since. Had lately been treated by a specialist continuously for three months without any benefit. On examination found he had hypertrophic pharyngitis. Membrani tympani very much depressed. Tubes very difficult to inflate. Tinnitus like the singing of insects and never ceasing. The watch could not be heard on contact with either ear, and the voice was only audible in loud tones about a foot away.

January 27. After five treatments, he reports that a nickel clock which he could only hear six inches away before treatment, he could now hear ten feet away, and for conversational tones was remarkably improved. The distressing features of his tinni-

tus had been entirely relieved by the great modification in its intensity, so that it does not bother him at all. A stuffed-up feeling, attended at times with acute pain in mastoid and around external auditory meatus, is entirely cured.

May 6. These improvements have continued to the present time.

CASE II. George M., sixty-seven years old, white. He had deafness for fifteen years, accompanied by hypertrophic pharyngitis and eustachian tubes were very difficult to inflate. The membranes opaque and very much depressed. Hearing for the voice very difficult without the aid of a trumpet. This case looked so unpromising that I had concluded not to put this new treatment to so severe a test, but at his earnest solicitation I allowed him to sit down at the phonograph. It was on October 6, 1891, that treatment was commenced. This man came daily for two months or more, without the slightest improvement, but on January 16, 1892, makes the following statement: "I hear the clock tick in my room, which I had not done for years." On investigation I found the hearing for the voice miraculously restored. He carries on a conversation, in ordinary tones, thirty feet away, with his face turned away from the speaker.

The above two cases were presented by me last winter before the Clinical Society of Maryland and District of Columbia.

CASE III. Mr. E. N., age fifty-six years; married; white; clerk. First came for treatment March 12, 1892. Has been deaf in right ear twenty years. Tinnitus, pulsating while walking at each step, but stops when he is still. Besides this he has a fine ringing sound which is present at all times, and is heard above the loudest vibrations of the phonograph. In the left ear there is a slight ringing, and can just hear the watch on contact. He has a sensation of a hat box being jammed down on his head. His voice sounds distant and dull, the conversation of others sounding natural when spoken loud enough to hear. This ear was all right up to an attack of grippe last January, 1892. Membranes in both ears excessively retracted. Eustachian tubes very hard to inflate. Has hypertrophic pharyngitis.

On May 4, the right ear, which had not heard a watch on contact for at least ten years, now can do so at two inches away, and

the pulsating sound has ceased entirely for a week. This result has been reached by two months' treatment. The ringing remains just as pronounced, never ceasing. The sensation of a hat box being pressed down on head has not returned for three weeks.

May 6. The never ceasing ringing has been relieved since last treatment, due to a squeaking sound of the phonograph similar in pitch to his tinnitus. The very loud vibrations of a deep tone did not have the least effect on this ringing tinnitus; but just as soon as the pitch approached that in his ear, improvement was immediately manifest. This case is still under treatment, and he has not up to this date had any more than two treatments of the similar sounds.

CASE IV. Mrs. C., white; age forty-nine years. Been getting deaf gradually for six or eight years. Had influenza last year, since then getting much worse. Deafness came on in left ear during the attack. Tinnitus like distant ringing in both ears.

In right ear the watch is not heard on contact; in left three inches. Hearing for voices difficult. Both membranes depressed and eustachian tubes hard to inflate. The treatment on this case was commenced April 28, 1892, and has had six applications of the vibratory massage. She now hears the watch on the right side one inch from the ear, and on the left five inches. The tinnitus has been considerably modified.

CASE V. Mr. H. S., age forty-one. Catarrhal deafness, seven years' standing. Constant ringing tinnitus for two years. Has not heard a watch for eighteen months on contact. After five treatments tinnitus greatly modified, and hears the watch three inches from both ears. In this case both membrani tympani depressed and eustachian tubes inflated with some difficulty.

CASE VI. Mr. S. Gardner, age thirty-seven years. Came for relief of deafness and tinnitus October 5. Has had humming, buzzing tinnitus, and deafness in left ear for past week. Membrani tympani somewhat depressed, and tube easily inflated but does not relieve the deafness or tinnitus. The watch is heard on contact. The first treatment completely relieved the tinnitus, and restored the hearing for the watch six inches. The second treatment increased the hearing to nine inches, since when the patient has not returned.

With this, I will close the illustrative clinical cases showing the efficacy of massage by means of vibratory force in certain kinds of catarrhal deafness. Most of these patients had been under the ordinary modes of treatment, stating that they had not derived any benefit, and I would like to again call your attention to the fact that during their treatment with me nothing but massage was used.

I have been using the phonograph up to this date; but feel the necessity of a more perfect instrument, for this particular purpose—one which will give the vibrations of a single tone at regular intervals continuously for any length of time, where the intensity can be modified at will, and the pitch can be changed with facility to suit the case.

Such an instrument has been promised me in time to bring to this meeting, in order to demonstrate this system of massage more fully to those particularly interested.

MASSAGE OF THE EAR BY MEANS OF THE PHONOGRAPH.

BY HENRY C. HOUGHTON, M. D., NEW YORK CITY.

At the request of the editor of this JOURNAL, the following statement of indications, method, and results of treatment of middle ear diseases by the use of the phonograph, under my observation since the first week in March, is given :

Massage.—By this term we understand manipulation of the tissues of the body by extension, counter-extension, rotation, palpation, succussion. This manipulation was first made by the hands of the operator, afterward by machinery as devised by Zander, Taylor, and others, and, in other instances, a combination of both.

Effects.—The effects of massage are increase of circulation, increase of metamorphosis, removal of deposits, formation of new tissues, etc.

Aural Massage.—The conditions which are encountered in diseases of the middle ear are two-fold : those of engorged, hypertrophic mucous membrane, which interferes with the mobility of the ossicula by pressure, restricting the free motion, or, on the other hand, an atrophic condition, with dry, rigid mucous membrane, closely investing the articulations of the ossicula, and producing a pseudo-ankylosis of the joints, causing rigidity, which not only interferes with conduction of sound pulses, but causes pressure and inter-labyrinthine tension, producing tinnitus aurium.

Aurists, the world over, have recognized the advantages to be derived from any apparatus which should overcome

these conditions. Politzer's method of inflation, Seigel's otoscope, Lucae's stemple, and various methods of manipulation of the external portions of the ear have been devised for this object. The only instrument, of which I have any knowledge, which acts in the same manner, or is at all suggestive of the same possibilities as the phonograph, is the otophone, first made by Mr. J. A. Maloney, now Dr. Maloney, of Washington, D. C. This consists of a modification of the ordinary conversation tube, so that sound pulses produced by talking upon a diaphragm at one end of the tube, cause a powerful vibration in the meatus and middle ear.

Dr. Henry F. Garey, of Baltimore, Md., published some results obtained in his clinic at the Southern Homeopathic Medical College, and the first week in March of this year, I visited his clinic. I was sufficiently impressed with the results obtained to make the necessary arrangements for application of the method in my own practice.

The apparatus consists of an ordinary phonograph, as used for purposes of correspondence by stenographers or by lecturers for exhibitions. The machine is run by storage battery and motor, and the ordinary cylinder, as used for receiving impressions, or rather, for reproducing impressions made upon the cylinder, is the agent by which the vibrations are produced. The depressions made in the cylinder are, however, not made by sounds produced by conversation or otherwise, as in the ordinary use of the phonograph, but incisions either in the form of lines, shallow or deep cuts, or, in fact, any roughness of the waxed cylinder will cause the reproducer to make more or less extensive excursions, and, therefore, more or less powerful succussions of the column of air lying above the diaphragm. The column of air above the diaphragm is made continuous with the air in the external auditory canal by an ordinary rubber stethoscopic tube, the ear tubes of which fit more or less closely in the meatus. There is connected with the motor of the phonograph a governor which regulates the rapidity of revolution of the cylinder, and adjustment

of this gives more or less rapid revolution of the cylinder, therefore, more or less frequent succussion of the volume of air in the tube of the external auditory canal, and, hence, a corresponding movement of the drum-head and ossicula. The main effect of a revolution of the cylinder, —the reproducer point being in contact with the surface,— is to produce a sensation of great noise, joined with a sensation as of blows. If the revolution be slow, the sensation of blows is very distinct, but if rapid, the sense of blows is lost in the general confusion of the great roar. A sitting of from five to twenty minutes produces upon different subjects a sensation of heat, itching, dilatation, openness of the meatus, with great confusion in the head, which gradually passes away. (In some, discomfort, almost distress, in the occiput, similar to that which is noticed in patients with eye strain.) With hearing people this is all that is noticed. In the deaf, there comes a secondary result of more acute hearing after an interval of three to six hours, which is more or less temporary. Continued treatment of non-hearing subjects produces increased secretion of the mucous membranes of the head, neuralgia, muscular soreness, which, in one or two instances, I have noticed extend to the clavicle and scapulæ. Later on, a gain is noticed, first, for sounds which have not been previously recognized, such as carriages, cars, distant whistles, bells, etc., and then voices without being able to recognize the words, and so the gradual improvement is noticed.

This is a new departure, and we are not in possession of sufficient data to state positively the exact sphere of the method, but, certainly, the brief experience which we have had is a favorable one, and offers large hope of possibilities for the future.

The indications for the use of this method are, first, that hitherto almost hopeless class of cases, characteristic of atrophic processes: rigid, retracted membrana tympani, immobile ossicula, with open eustachian tubes that are not benefited by ordinary methods of treatment, and are injured by excessive inflation. The improvement in these

cases is less marked, and slower than in the cases characterized by hypertrophic conditions, with excessive secretion, because these cases are amenable to other methods of treatment. Still, it is true that in all cases, this form of massage is a valuable adjuvant to internal medication and local treatment. In cases of so-called "consequences of chronic suppurative inflammation," where there is more or less rigidity of the modified apparatus, retractions, adhesions, accumulations, etc., the massage acts to increase the mobility of the parts, thereby improving the hearing, and restoring the natural sensation of the whole side of the head.

At some future time, I purpose to report a few cases when sufficient time shall have elapsed to judge of their progress and permanency of result. In a number of the cases under observation, the improvement was rapid and continuous while under treatment, and the remote results will be watched and reported. In one instance, a patient who had carried a large dipper trumpet for years, was obliged to lay aside the bowl of the trumpet after the first week's massage, and after three weeks' massage laid the instrument aside entirely. In another instance, progress was marked by fluctuations, increase, and decrease, but, on the whole, a slight improvement. In other instances a period of three weeks made no apparent impression upon the hearing, although it modified the tinnitus; in others the tinnitus was abolished, but the hearing distance did not show any increase by the watch test.

My anticipations are that this method will be developed, modified, and improved by the study and application of many minds, and that the outcome will be the perfection of some instrument more simple in construction, more easy of application and feasible for use, not only by the surgeon, but by the patient, under the direction of the surgeon, after the latter shall have determined the essentials in each particular case.

HERPES ZOSTER OPHTHALMICUS.*

BY D. A. MACLACHLAN, M. D., ANN ARBOR, MICH.

Herpes of the eye is a rare affection, but often a very serious as well as painful one, and the very fact that it is rarely seen makes it all the more liable to be mistaken for something else, and indifferently treated by the general practitioner. Two varieties have generally been described—herpes febrilis, or catarrhalis, and herpes zoster ophthalmicus. The former is a mild, and the latter a severe affection. Pathologically the two forms seem to me to be one and the same thing.

The herpetic vesicles, like zoster in other parts of the body, follow the distribution of the superficial sensory nerves, and are the same in both the mild and severe form of the disease. Noyes says, "It is in truth a neuropathic affection, having its cause in a degeneration of the ganglion of Glasser, or of the branches of the trigeminus, or of both." I think the condition is now generally believed to be an acute neuritis. The inflammation may begin in the brain itself; it may begin in the nerve trunk, involving the ganglion; it may begin in the peripheral portions of the nerve and be limited to them throughout the course of the disease; and it may be a neuritis ascendans, beginning at the periphery and afterward extending upward to the trunk of the nerve. It seems altogether probable that, when the trunk is involved, the severe type of the disease, herpes zoster ophthalmicus, is the result; and that when the peripheral nerves only are involved, the mild form, or herpes-febrilis, is present.

* American Institute, 1892.

Herpes febrilis, or catarrhalis, is so called because it so often accompanies, as herpes labialis does, catarrhal inflammations of the respiratory tract. It attacks persons in middle life or old age generally.

The initial symptom is usually severe pain in the supra-orbital nerve and other parts of the face. Within a few hours, the skin of the forehead and about the eye becomes red and hot, and the tissues beneath swollen, looking like erysipelas, for which it is generally mistaken. The skin is tender to touch, and vesicles soon appear along the course of the nerves, which break and form scabs. Should it extend to the eye, as it often does, there will be congestion and photophobia, and ulcers on the cornea (Herpes cornea and conjunctiva). It is generally confined to one side, the left as a rule, and permanent scars often remain to mark the seat of the ulcers. When ulcers invade the cornea, it is generally anæsthetic, especially about the ulcer. Fever and quickened pulse may be present also.

The mild form is more frequently seen, yields more readily to treatment, lasting only a week or ten days if well managed; is superficial in character, and causes no permanent injury to the eye. The severe form, on the other hand, is comparatively rare, is much less amenable to treatment, lasts a much longer time, especially if complicated by some serious malady, tends to deep ulceration, and is pretty sure to impair vision permanently if it does not completely destroy the eye. Sometimes the other eye sympathizes, when iridocyclitis has resulted, and the patient may thus be rendered practically blind.

Horner, in 1871, was the first to give us a clear description of the disease, and to teach us how to distinguish between the two varieties, although Hutchinson, Bowman, and others had mentioned it years before.

The following case illustrates how serious the results of the disease may be, and how necessary it is for the physician to recognize the danger and avert it if possible.

August 18, 1891.—Mr. B., æt. fifty-eight, a prominent farmer and millowner, and an Englishman by birth, consulted me, by

the advice of my friend, Dr. E. F. Chase, of Dexter, Mich., on account of severe inflammation of the left eye.

He gave the following history : About one month before he was seized with what was supposed to be erysipelas. The inflammation began on the top of the head, and spread gradually to the left temple, forehead, eye, and cheek. The parts were red, hot, swollen, and painful or tender. A number of small herpetic vesicles formed on the left side of the forehead and scalp, which were the seat of severe burning pain and exquisitely tender to touch ; they changed later to ulcers, which left permanent scars to mark their former site.

The eye became intensely inflamed and the lids and conjunctiva enormously swollen. This great œdema of the lids during the early part of the disease no doubt obscured the inflammation of the deeper parts of the eye, so that it probably was not correctly estimated, but when I first saw the patient there were still several nearly healed ulcers on the cornea, which showed that it had shared fully in the herpetic inflammation.

On the occasion of his first visit to my office, in addition to the above, the following points were noted in my case-book : Ptoxis, quite marked ; conjunctiva and sclerotic deeply injected ; cornea hazy and dotted, and an entirely opaque patch at the lower outer border, one-eighth inch in width. The aqueous humor was turbid ; the iris discolored and thickened ; the pupil hazy, contracted, and irresponsive to light—only slight oval dilatation took place on instilling a four-grain solution of atropine. The fundus could not be seen, but vision was less than $\frac{20}{200}$, and there was decided photophobia.

He still complained of the burning pain in the region of the supra-orbital nerve and the temple, and of tenderness of the scars left by the ulcers. The pain was aggravated at night and was relieved somewhat by a lobelia lotion which he had been using.

The patient is an unusually intelligent, active, and energetic business man, ruddy and somewhat fleshy, but not "beefy," as many of his countrymen are. The severe pain had told upon him somewhat, but his general condition might be called good.

He was given a ten-grain lotion of boracic acid to bathe the eye, and a four-grain solution of atropine to be dropped into the eye every four hours, with mercurius corr. internally. The latter was changed to arsenicum 3 x later on, and the galvanic current

applied for the neuralgic pain, which still was hard to bear at times.

The condition improved steadily, and on the 28th of August vision was $\frac{20}{50}$, and the congestion considerably lessened. The last prescription—unguentum hydrarg. oxid. flav., grs. iv— $\frac{3}{4}$ once, and the atrop. sol. twice daily, externally, and strychnia phos. 4 x, four times daily, internally—was made November 14. The corneal opacities remained, but were less decided, the injection gone, the pupil still hazy and inactive, and more or less pain at times.

At this writing the eye looks to be nearly restored to its former condition. A few semi-transparent dots remain over the central part of the cornea ; the pupil is nearly clear and partially responsive to light. Vision is $\frac{20}{40}$. The scars on the forehead and temple are still distinct, and quite tender to touch. The pupil dilates irregularly, about half size, and the iris is adhered fully at the lower margin. The fundus presents marks of extensive retinitis, the disk is ill-defined, and the peripheral vessels have disappeared or shrunken greatly.

The eye is "weak," and doubtless will never be quite strong as before, but, considering the severe character of the lesion, the patient may be congratulated on the result. Had I seen him earlier it is possible that a still better result might have been attained—the iris might have been kept free from adhesions, and, perhaps, the still deeper inflammation might have been averted. At any rate, the general practitioner, and the specialist as well, may well be on guard for a disease so difficult to diagnose at first, so distressing and prolonged in its course, so hard to treat properly, and so likely to be followed by permanent impairment of function.

A PHARYNGO-LARYNGEAL ULCERATION.

BY H. C. CHISOLM, M. D., HUNTINGDON, PA.

October 19, 1890, I was called to see Mr. P., aged fifty years. He stated to me that he had an attack of la grippe in February, 1890, which was followed by great prostration and by soreness and swelling over his right side. The latter being the result, so his physician stated, of a congestion of the liver. He received quinia and calomel. The soreness disappeared from his side but the weakness remained and early in June his throat became sore. Although he spoke to his physician concerning it, no examination was made until some time later. He was given a gargle to use and after several weeks some application which he was to make himself with a camel's hair brush. As the throat grew steadily worse and the prostration more marked, he went to Philadelphia and consulted a physician there. He was given no encouragement whatever and returned home.

A little while later I was called. I found him very weak, greatly emaciated, being six feet one inch tall, and weighed, in health, one hundred and eighty pounds, while then he only weighed one hundred and thirty-two pounds and was still losing flesh. Great thirst and hunger, which could not be satisfied on account of his inability to swallow, voice almost lost, being able to make himself understood only by a great effort; slept but little, was unable to lie down except for a few minutes at a time on account of the great amount of discharge from the throat.

Pulse 80 and weak, lungs emphysematous, no râles. An examination showed a large ulcer on the posterior wall of the pharynx beginning near the vault and reaching almost to the larynx. It was covered with a thick, sticky, gluey, and stringy discharge that was very offensive. Right arytenoid ulcerated, epiglottis much enlarged, tuber-like, but without visible ulcera-

tion, an ulcer deep in larynx, left sub-maxillary gland swollen; pain in neck and back of head.

His health had previously been good. Had railroaded for twenty years and had been exposed a great deal before the beginning of his sickness in February. Could find no history of syphilis. No family history of scrofula, though two members of his family had died from cancer.

The ulcer was thoroughly cleansed with a carbolized spray, when it seemed that the bodies of the vertebræ were almost exposed. On account of the extreme weakness of the patient nothing further was attempted that day. The following night four small pieces of bone came away with the discharge from the ulcer. These were thin and flat and were followed by the discharge of a quantity of blood and by a discharge of blood at intervals for several days thereafter.

The treatment at this time consisted in keeping the throat clean by use of a spray of warm carbolized water or a ten per cent. solution of calendula, the use of iodoform locally and the internal use of iodide of arsenic 3 x. Within two weeks the ulcer deep in the larynx had healed and the patient was able to take a little milk and wine, though he continued to grow weaker and to lose in weight. He would seemingly gain for two or three weeks and within a few days, without any apparent cause, lose all he had gained.

I used with him at different times iodide of arsenic, lachesis, nitric acid, and ferrum phos. On February 13, 1890, at my request he visited Dr. Horace F. Ivins, of Philadelphia, who after examination, advised the use, locally, of peroxide of hydrogen and of calendula ten per cent. solution and the administration, internally, of iodide of arsenic unless some other remedy was especially indicated, and to nourish him by feeding through a stomach tube. This the patient so strongly objected to, that I decided to risk the small amount of wine and milk he was taking for a little while longer. The use of the peroxide of hydrogen was begun and the calendula solution continued with iodide of arsenic interally.

Three or four days after his return from Philadelphia, the throat became dark, œdematous, extremely painful, with at times oozing of blood almost black in color. Lachesis 30 x was prescribed in place of the iodide of arsenic, the same local treatment was continued.

Though the throat remained dark and irritable the patient was, after a few days, able to take more nourishment, whipped eggs being added to the milk and wine. This continued till in March, when I thought death was soon to end his suffering. The dark masses commenced to break down, and within a few days we had an ulcer running from the vault down the throat, measuring in length two and one-eighth inches, involving the mouth of the eustachian tube on the one side and extending to within a line of the tube on the other side. Back of head and neck became very sore, the cough increased as did also the swelling of submaxillary glands and the emphysema of the lungs, while râles appeared over the upper part of right lung, the eyes were sunken, night sweats, prostration so great that he had to exercise great care in getting from lounge (where he insisted on being) to chair. Jaundice appeared, and he was again unable to swallow. I now cleansed the throat with a 25 per cent. solution of calendula, packed the ulcer with arsenicum 3 x trituration and gave arsenicum 3 x internally. Under this treatment I noticed a marked improvement on the third day, and at the end of two weeks the patient was able to take more nourishment than at any time since I had first seen him; granulation set in from below and there was a slow but steady filling up of the ulcer.

By May he was able to take, in addition to his milk and eggs, beef tea, if strained, broths, and gruel. Toward the latter part of May the improvement seemed to stop and, while I could not see that anything was lost, nothing was gained. I then cleansed the throat with a ten per cent. solution of calendula and dusted the cleansed surface of the ulcer with aristol, giving internally fluoric acid. There was again a prompt improvement. Granulation kept up, patient was able to take some solid food and gained in strength and flesh. From this time till about December, the local treatment varied but little and the patient had so far improved that he felt he must return to work. He went on a night job and the first night was caught in a rain and snow storm. He contracted a heavy cold and, within twenty hours, the discharge from the throat had returned, together with the soreness in back of head and neck. His feet and legs to the knees had greatly swollen and were discolored—one spot being natural while another was about the color of calves' liver, this discoloration being evenly distributed from feet to knees. The parts were very

painful, the patient very nervous ; complained of stiffness of the tongue and difficulty in swallowing. Crotalus 12 x was followed by improvement. Within a week the legs were normal in color and size, discharge from throat checked, and the soreness about the neck had disappeared. He remained very weak for two or three weeks but again began to gain in strength when during February another attack exactly similar to the first came on. Under the same treatment, he made a good recovery but was left weak and had lost considerable flesh. The throat remained in fair condition.

Since that time his improvement has been steady. His weight is now about 173 pounds ; his voice, while husky, is strong ; he eats without difficulty so long as he does so slowly. He suffers no pain and there is but little discharge from the ulcer. The ulcer as it now exists is behind the soft palate, about half an inch long and one-quarter of an inch wide, being immediately over the part from which the bones were dislodged. Granulations have taken place here but are not permanent. Of the various washes used, those that have seemed to do most good were calendula and carbolic acid. The only drugs under which there has been marked improvement in the ulcer were iodide of arsenic 3, arsenic 3 and lachesis 30.

What this ulcer is or what the final outcome is to be I am unable to say. The case has been a most interesting one to me, and, had there been ordinary care in the early stages, I do not believe the trouble ever would have been serious.

TREATMENT OF INDOLENT CORNEAL ULCERS, WITH CASES.

BY HAYES C. FRENCH, M. D., SAN FRANCISCO.

The fundamental proposition in this paper is to convert ill-conditioned sores into fresh wounds; and as the results would seem to justify the experiment, we doubt not the method will find even a wider range of application than is here outlined, and will prove equally efficacious in superficial abscess, and some forms of corneal phlyctenulæ. During the past few years the writer has had a most gratifying experience in the treatment of certain forms of *ulcus corneæ* that previous to that time were a source of great anxiety, and frequent and often mortifying failure.

If we would allow the history of our failures more frequently to adorn our journalistic "tales," they might prove a greater boon to our colleagues than do over-drawn pictures of success. We have never forgotten Dr. Liebold's forcible advice in regard to cutting out by a clean sweep of the knife, without much anxiety as to the amount of corneal substance sacrificed, those ragged foreign bodies that so often become enmeshed in the delicate stroma of the cornea, and the removal of which by the ordinary method leaves a broad, deep, and jagged wound. This memory with the frequent observation of the perfect and sometimes magical recovery of the cornea from all clean cuts, whether accidental or operative, led to the treatment which in our hands has proven so successful. A few clinical cases will best set forth the method which we advocate.

CASE I. A few days previous to our departure on a long

journey, a lad of six years was brought for an ulcer of the cornea, located very near the visual axis, and attended by great pain, photophobia, and profuse scalding lachrymation. The parents of the child were very anxious that a cure should be secured before our departure. The best indicated remedies were prescribed and the perplexing problem of a speedy cure occupied our leisure moments till he came again the day following, with no appreciable improvement. Radical measures were then decided upon and cocaine powder was dropped on the globe as near the ulcer as possible, when, with a very fine round steel spoon, with sharp edges (a Parisian find), the contents of the ulcer were thoroughly scooped out. The eye was then irrigated with a warm solution of boracic acid, and all other remedies were discontinued. After the operation the little patient opened his eye widely, experiencing no trouble from the light, the same being true after the effects of the cocaine had passed away. The day following, to our great delight, he returned practically cured; the pain, photophobia, and lachrymation having entirely disappeared, a slight congestion of the conjunctival vessels alone remaining.

CASE II. A boy of about two years, of strumous habit, whom we had treated for similar attacks several times previously, had, during our absence, been under the care of a colleague for a period of six weeks, with no appreciable change in his condition. Examination revealed an ill-conditioned superficial ulcer, about two lines in diameter, mid-way between the limbus and axis of vision, on the temporal side. The lachrymation was profuse and scalding; the lid margins were excoriated, and there was a pustular condition of the nasal and facial integument adjacent. Cocaine was dusted upon the ulcer, and with the spoon before mentioned the ulcer was scraped out as thoroughly as possible with the ocular and palpebral spasm with which we had to contend. Immediately there was a marked diminution in the photophobia and lachrymation, and gradual and continuous improvement followed. He was only prescribed for four times between the operation and his recovery, and was under observation less than a month. In this case the constitutional diathesis complicated the local trouble, and doubtless retarded the cure.

CASE III was a lady of forty-two, a decided brunette, and slender in build, with an ulcer which, the history of the case

would indicate, started as a corneal phlyctenule, about three weeks previous to the date of her application for treatment. From the first she had suffered most excruciating pain, not only in the eye, but along the track of the fifth nerve, and in the occipital region. The photophobia was moderate, but she had been deprived of sleep to that extent, that, to use her own language, she was "worn out with pain and loss of sleep." Here was a true *ulcus serpens*, nearly one-fourth of an inch in length, and rapidly burrowing its way parallel with, and about one-eighth of an inch from the limbus, on the nasal side of the right eye. The ulcer was about two lines in width and filled with a grayish-white débris, and in depth almost reaching Descemet's membrane. Powdered cocaine was applied liberally over the course of the ulcer, when with care not to disturb the internal limiting membrane, it was thoroughly scraped out as in former cases, leaving a deep, narrow ditch, penetrating almost through the substantia propria, but extending no farther laterally than was indicated by the external limits. A very delicate galvano-cautery knife, thin as writing paper, and about two lines in width (also a Parisian product), was then heated to a white heat, and the sides of the ulcer were lightly touched, instantly withdrawing the knife after contact with each portion, to avoid injury or destruction of healthy tissue. This method of applying the cautery knife has several advantages over the ordinary one of turning on the current *after* instead of *before* the knife is in place; the chief one being the perfect limitation of the depth of the cauterization. The requirements are a fine knife, a perfect light, absolute self-control on the part of the patient, and a steady hand and fine touch on the part of the operator. With these concomitants it is an ideal operation, and the results will often prove almost magical. The little pain following so radical a measure was no less a surprise to the doctor than to the patient. From the very first she expressed a sense of great relief from pain, and after the first twelve hours was free from discomfort. The second day after the operation only a slight depression remained in the place of the ulcer, and not a sign of débris, and already a smooth transparent epithelium had formed over the slight depression, and with the unaided eye it was difficult to detect any signs of the recent ulcer. Vision at this time was $\frac{20}{30}$, rapidly rising within the next six days to $\frac{20}{20}$. At Moorfields,

London, we witnessed cauterizations of the cornea with much less delicate instruments and care in the application than we had employed, yet with results with which those conservative surgeons seemed satisfied. These cases, with many similar ones from which they were taken, are calculated to raise some enthusiasm along this line of treatment, yet there is doubtless a clearly defined line of limitation in the legitimate application of the method. So far as our observation has gone we would lay down the following rules as roughly outlining a safe ground on which to proceed, always allowing for exceptional cases along the border line between the two great classes that seem to warrant or contra-indicate the treatment :

1. This treatment is especially applicable to all ill-conditioned wounds or ulcers of the cornea that manifest no healing tendency, usually denominated *indolent*, and that do not involve the uveal tract.

2. To superficial abscesses of the cornea, especially "cold," or chronic ones.

3. It may, or may not, be indicated when the ciliary region is involved, in case of hypopion, or when sympathetic ophthalmia is threatened. These complications demand a careful and conservative judgment.

4. The method should be employed with caution on extremely irritable and neurotic patients ; and in those cases, especially of acute ulcer, in which energetic recuperative power is manifest in the natural course of the disease.

TWO CASES ILLUSTRATING THE COMPLICATIONS OF DISEASE WITHIN THE TEMPORAL BONE.

BY DUDLEY WRIGHT, LONDON, ENGLAND.

The various secondary results of long standing middle ear disease are now fully recognized and understood, and their treatment—mainly on surgical lines—has, hitherto, been fairly successful and bids fair to accomplish still more in the future.

The two following narratives are taken from cases lately under the observation of the writer, and, through both terminated fatally, they may yet prove of interest to other observers. In the first no treatment was adopted for the complication, as its presence was not really suspected until death took place. For the second, three operations were performed, each of which gave considerable temporary relief, though they did no more than stave off for a few days the fatal result.

CASE I. Female, aged twenty years, suffering from “influenza” accompanied by marked mental and nervous disturbance. Suddenly fatal result on the tenth day after appearance of acute symptoms. Necropsy revealing a large abscess of right temporo-sphenoidal lobe secondary to caries and necrosis of the roof of the tympanum.

Marion Y., aged twenty, first seen on January 28, 1890, during the first appearance of the “grippe” epidemic. Complaining of pains in the head, back, and limbs, and general *malaise*. Patient has never had any serious illness. A polypus was removed from the right ear, two years ago, and the ear has received a good deal of treatment ever since on account of a chronic discharge.

Family history exceptionally good.

The present illness came on, seven days before first being seen, with feverishness, pains in the limbs and head. She had, also, been troubled with coldness of the extremities and difficulty in passing water. The patient thought she had influenza, as several in the house were ill with it at that time.

Examination gave negative results so far as the heart and lungs were concerned. The tongue was dry, slightly furred and tremulous, and the breath offensive. Temperature 102.2. Three patches of herpes were present on the left side of the face; one being just below the malar bone, another below the angle of the mouth, and one on the chin; there was also another patch on the right side of the mid-line of upper lip. These patches had all appeared two days previously. The patient's mental condition was somewhat peculiar, constantly sighing and calling out with the pain in various parts of the body.

January 29. The temperature was last night 102°, this morning 99°; slept about three hours in the night; rest of the time she talked incessantly and rambled a great deal. This morning she has much pain on the right side of the body. No sign of heart or lung trouble.

January 30. Temperature 100.4 last night; 98.6 this morning. Retention of urine needing withdrawal by catheter. Slept better.

January 31. Temperature 99.2 last night, normal this morning. Catheter still used, 5 xxxi of urine withdrawn. Sordes on teeth and lips, tongue still furred, and herpes present. Pains in the limbs nearly gone, but has pain at back of head and neck. Is very dull when spoken to. Enema of soap and water ordered, as the bowels have not acted since admission. The enema was given at 11.15 A. M., and a few minutes after its administration the patient suddenly became comatose with stertorous breathing; insensitive conjunctiva, and widely dilated pupils. Death occurred in about three-quarters of an hour, the heart continuing to beat for two minutes after apparent cessation of respiration.

Post-mortem Examination.—Slight amount of congestion of bases of both lungs. Heart and spleen normal. Both kidneys somewhat congested, and capsule tearing kidney substance. Liver contained more blood than natural.

Examination of the brain showed marked fullness of the meningeal veins. On removing it from the cranium the right temporo-

sphenoidal lobe ruptured and about $\frac{3}{4}$ iij of fetid greenish pus escaped. A large abscess cavity occupying the greater part of the lobe was found with a thick pyogenic membrane present. The roof of the tympanum on which the affected lobe of the brain rested showed marked signs of caries, and in one part had a small perforation of about $\frac{1}{16}$ inch diameter leading from the middle ear. (The temporal bone was not removed for further inspection.)

It is quite possible that the patient whose history is recorded above was suffering from influenza; and, further, one may reasonably presume that the latter complication somewhat accelerated the fatal termination. The abscess itself must have existed for a considerable time in the brain substance, and its curious latency is rather difficult to account for. While the patient was under observation some symptoms were present which were highly suggestive of a brain lesion. The peculiar mental conditions, and the cephalalgia would have probably more forcibly directed the attention to the brain as being the seat of the mischief, were it not that these symptoms can be very markedly present in a moderate attack of influenza.

In the Hunterian lectures of 1889, Barker* gives a very good account of the present knowledge of the various clinical symptoms present with different complications of mid-ear disease. He points out that, when the cardinal symptoms, viz., optic neuritis, vomiting, and cephalalgia—of an intra-cranial lesion are to be found; the presence of *slow and sluggish cerebration*, an abnormally infrequent pulse; constipation; and, after an initial rise, the maintenance of a normal or sub-normal temperature, strongly point to a localized collection of pus in the cerebrum or cerebellum. He further points out that pus in the case of a cerebral abscess may be either localized by a limiting pyogenic membrane, as in this case; or diffused throughout the substance of a lobe without any trace of bounding lymph. He considers the first form to be more amenable to treatment, inasmuch as a

* Hunterian lectures on intra-cranial inflammation starting in the temporal bone.

complete evacuation of the abscess can be obtained and more thorough drainage carried on.

We have now learned that the advances of surgery within the last few years have made it possible to save a patient from any of the direct complications of middle-ear disease, so long as there is not a diffuse meningitis or advanced pyæmia. In our second case the attempt was made, and I am of opinion that, had I opened the sulcus lateralis at the time of the first operation and given a free exit to the pus therein contained, the outcome of the case might have been very different from what it was, and the patient's life have been saved.

CASE II. Subdural abscess and thrombosis of the lateral sinus secondary to suppuration in the mastoid antrum in a child aged twelve years, treated by trephining and removal of pus from both situations, together with exploration of the tempero-sphenoidal lobe. Pyæmia ; death ; necropsy. * Florence F., aet. twelve, was first seen on October 20, 1891, and was at that time complaining of severe pain around the right ear radiating over the right temporal region ; slight offensive brown-colored discharge from the ear, and general feeling of malaise.

The discharge had been present for three years ; one year ago the patient had an attack of scarlet fever, after which the discharge slightly increased. The pain came on for the first time three days ago. Two days ago the patient vomited once, and had a slight "fit," but nothing definite had been noticed about it beyond that the arms twitched a great deal and there was no actual loss of consciousness.

On being first seen the temperature was 101.6. the mind was quite clear, though the child was evidently in great pain. The skin was dry, and tongue rather coated. Pupils equal, no redness or œdema over the mastoid process, but this, at the right temporal region, was distinctly tender to pressure.

The next day (October 21,) the patient was admitted into the hospital. The above symptoms were still present and examination of the meatus showed it filled with florid granulations which bled readily when touched with a probe and prevented a view of

* This case was reported rather more fully in the *Monthly Homeopathic Review*, January 1, 1892.

of the drum. There was a fairly free, offensive discharge from his ear. Ordered bell. 1 x. merc. sol. 2 x in alternation and perchloride of mercury solution 1-4000 as aural douche every four hours.

The patient became steadily worse. The pain increased; the temp. varied between 103° and 99°; the pulse was very frequent, at times reaching 150 per minute; there was great restlessness, and the patient grew dull and was constantly sighing and moaning. On the second day of admission, commencing double optic neuritis was found. On October 24, it was decided to trephine the mastoid and evacuate pus, if present. The temperature at the time of operation was 102.6°.

First Operation.—A two-inch incision was made directly behind the right auricle, having its center opposite the mid-point of bony meatus. The pericranium was then pushed aside and a trephine (one-quarter inch diameter) applied to the bone and worked in a forward, inward, and slightly downward direction. The mastoid antrum was soon opened and the entrance enlarged by gouging the bone.

This gave exit to about a dram of extremely offensive pus. The middle ear was now thoroughly scraped out through the meatus and mastoid opening, granulations and a small quantity of carious bone being thus removed. The whole area of operation was then flushed with a weak carbolic lotion. Iodoform and glycerine emulsion (five per cent.) instilled into the cavum tympani. A small drain tube into the mastoid opening and iodoform gauze completed the dressing.

The night after the operation the patient was restless and delirious, but the condition next morning improved, the pain having nearly gone and the temp. registering only 98.2°, the pulse, however, was still abnormally frequent. Free discharge from mastoid wound necessitating dressing twice a day.

The next day, October 26, the patient was again worse. The temp. showing considerable fluctuations and pulse frequent. The optic neuritis was well marked. A trace of albumen was present in the urine, and the patient had a rigor. In the afternoon it was decided to trephine and explore the temporo-sphenoidal lobe for abscess.

Second Operations.—Performed under chloroform. The spot selected for trephining was a point one and one-quarter inches behind the center of meatus, and one and one-quarter inches

above Reid's "base line." A semilunar incision was made over this, the pericranium raised up, and a three-quarter inch trephine applied. The circular piece of bone was removed and the dura mater bulged into the wound; this was incised and an exploring needle passed in various directions into the brain substance, but no pus was found. The wound was then flushed with warm carbolic lotion and some of the brain substance, which was bulging through the trephine opening, was cut off. Three pieces of bone were replaced and the pericranium stitched with catgut. The scalp flaps were brought together in a similar manner and iodoform gauze applied. The patient recovered well from the immediate effects of the operation, the temp. falling from 105° to 97.6° . She passed a fair night, but the fever returned the next day and the general condition was worse, the patient at times being almost unconscious. She had daily rigors up to the 29th of October, and on one occasion the temp. rose to 107° . The optic neuritis remained the same.

On the night of the 29th, I had a consultation with my colleague, Mr. Knox Shaw, and we decided to make one more effort to save the patient by opening up the sulcus lateralis with the hope of getting at the root of the mischief.

The operation was performed at midnight, the patient being in a semi-comatose condition and having a temperature of 105° .

Third Operation.—An incision was made at right angles to the previous mastoid wound, and the bone quickly chiseled away in successive layers until the lateral sinus was exposed just behind the mastoid process. The opening was then enlarged upward with bone forceps in the direction of the sinus; by this means a somewhat circular opening of about three-fourths inch diameter was made, at the bottom of which the lateral sinus was seen pulsating. A probe was then passed backward between the sinus and the bone, and a quantity of fetid pus escaped. This was repeated several times and also in the direction of the superior petrosal sinus along the posterior surface of the petrous bone. There did not appear to be any clot in the sinus at the time of operation, for it refilled after being emptied by gentle pressure, but its walls were covered by firmly adherent lymph. No opening was, therefore, made into it. Before terminating the operation, the old trephine incision over the temporo-sphenoidal lobe, which had nearly healed up, was reopened, and the parts in-

spected to see if there was any pus beneath the dura mater, but it was found quite healthy and the bone left in the trephine opening had become adherent to the membrane. The dressing of iodoform gauze and tubes along the course of the lateral and superior petrosal sinus completed the dressing.

The temperature fell to 97 ° after the operation, and during the next day did not rise above 102 °. The following day, October 30, the patient had another rigor. The general condition was fair, the wound looked healthy, and the discharge had entirely lost its offensive character. There was no pain and food was taken well and the patient slept well. Dressings removed twice a day, and the antiseptic lotion was syringed for a considerable distance beneath the dura mater. On November 1 the patient became worse. A cough developed and she had pain in the left side of the chest, where a distinct friction sound was heard. This continued and the patient gradually sank, the temperature remaining sub-normal for a few days before death, on one occasion being as low as 95.2°. The patient died on November 5, a week after the last operation.

Bryonia, china, aconite, and lachesis were all tried during the progress of the case, but without avail. At the autopsy, extensive thrombosis of the lateral sinus of the right side was found, the clot extending downward into the jugular vein as far as the level of the cricoid and upward in the sinus to the torcular Herophili. The veins leading from the brain to the lateral and petrosal sinus were extensively thrombosed. No abscess in any part of brain, and no appreciable meningitis. The roof of the mastoid antrum was necrosed and carious, the ulceration having spread up the petro-squamous fissure, thus effecting a communication between the tympanum and the sub-dural space. A septic infarct was found in the right lung, the left lung was collapsed, and the pleural cavity contained about 5 i of pus. All other organs fairly healthy. The trephine wound over the temporo-sphenoidal lobe had entirely healed up.

If we compare the two cases as reported here, we find that in our first example the process has been essentially a chronic one. The septic infection has traveled from the middle ear to the brain, leaving the intermediate tracts of tissue, with the exception of the bone, to all appearances, intact.

In our second, the process was more acute; a direct communication existed between the tympanum and the subdural space through the petro-squamous fissure. In such cases the pus having once found its way on to the surface of the petrous bone, quickly gravitates toward the sulcus lateralis, and gets up a septic process around, and often within the sinus. This leads to the formation of a clot loaded with organisms, and portions of this, detached from time to time, give rise to septic abscesses in the lungs, where they lodge. Fortunately, our knowledge of the train of events in such cases is so satisfactory that we are able to see in what way our efforts for the cure of the patients should be directed.

The diagnosis having once been formed, immediate steps should at once be taken to prevent the process from extending. The sulcus lateralis should be opened; all pus between the sinus and the bone thoroughly removed; the sinus itself opened, if there are evidences of its contents having undergone coagulation; the clot, which, in nearly all instances, is highly septic, removed, and the internal jugular vein tied *low down* in the neck in order to prevent portions of the clot from becoming detached and setting up pyæmia.

Had the latter step been taken in my second case it is quite possible, even though the opening of the sulcus lateralis was too long delayed, that the systemic infection which afterward took place might have been prevented. The ligation should always be performed as low as possible, so as to get well beyond the lower extremity of the thrombus.

Ballance* reports four cases in which the sinus was opened and the vein tied. The first of these was successful, in spite of the fact that pyæmic abscesses subsequently formed in the buttock, neck, and lung, and the whole of the lateral sinus of the side operated on sloughed away as far as the torcular. The second case was fatal from hyperpyrexia; the third from acute laryngeal spasm, following a

**Loc. cit.*

secondary abscess in the ary-epiglottic fold ; and the fourth was a complete success, the patient being convalescent three weeks after the operation.

He justly remarks that ligature of the sinus itself is bad practice ; an entrance of necessity being made to the intradural space, and the patient being thus subjected to the risk of acquiring meningitis.

With regard to the operation itself, to my own mind, the gouge is preferable to the trephine in exposing the lateral sinus, on account of the inequalities of the bone in this region ; but for opening the mastoid cells the reverse is the case. Here I use a quarter-inch trephine, and it serves the purpose admirably, a gouge being afterward used, if necessary, to enlarge the opening.

All necrosed bone within reach should be removed, and the mastoid antrum and cavum tympani thoroughly scraped out so as to remove granulations or polypi. In operating for cerebral abscess the trephine should be as small as possible, one having a diameter of a quarter inch, as Barker* has shown, being ample. Through this opening an exploring needle can be made to traverse any portion of the suspected lobe, the proceeding taking but little time, and allowing further procedures should the result be negative. The same rules apply to exploration of the cerebellum.

It is not possible in a paper such as this to give full details of the operations performed for, or to consider the differential diagnosis of the various intra-cranial complications of middle ear disease ; it has rather been the aim of the writer to sketch out roughly the line of treatment to be adopted ; to insist that operative interference should be promptly carried out, and that our efforts should not be relaxed until we have found out the exact seat of the complication, and by the removal of pus and blood clots and all other possible sources of infection, give the patient the best possible chance of recovery.

* Paper read before the Medical Society of London, March 31, 1890.

RECENT OPERATIONS FOR NASAL STENOSIS.*

BY W. A. DUNN, M. D., CHICAGO.

It is difficult to appreciate the value of nasal surgery to the human race within the last few years. Formerly, many diseased conditions within the nose, impossible to be seen and as difficult to reach, were allowed to develop and produce their serious consequences on the health of the human race.

Recent investigation of the nasal cavities has brought about a complete revolution in nasal and facial development. Not only did this serious change affect the nose, but the whole system suffered from the far-reaching consequences of nasal stenosis. After the discovery of the rhinoscope, and its application for investigation of nasal diseases, there soon came about the operative means within the nose.

Accompanying the possibility of nasal diagnosis came the search for treatment. The electro-cautery was hit upon as the most happy measure for relieving diseased conditions within the nose requiring surgical treatment, and, for a time, only the cautery was used in a vast number of cases; but, as investigation went on, it was found that many cases could not be properly relieved by destruction of tissue with the electro-cautery, and other remedies had to be sought for.

It is of quite recent date that more thorough and deeper operations have been performed for the relief of this class of cases that are beyond the reach of the electro-cautery.

American Institute, 1892.

Many cases on which I formerly operated with the cautery instrument were imperfectly relieved, because of the extreme degree of hypertrophy of the nasal tissue, or the malformation of the nasal bones, either from the septum or the turbinated tissues.

Surgical manipulation of the septum has been for a long time understood, and, while the earliest treatment was unscientific and barbarous, consisting of the use of the dental drill and boring machines, without the guidance of careful observation, the invention of properly constructed saws has modified this treatment until it can be more carefully done, and with less destruction of surrounding tissue.

The electro-cautery has reached a basis far below its original standard in nasal surgery, and is now one of the many instruments used for the relief of this sort of trouble. Its proper function is the treatment of certain cases of nasal stenosis, in which the tissue is not extremely enlarged, and the nasal opening is normally sufficient for proper respiratory function.

In that type of nasal disease in which there is a long-standing inflammation, in which the diseased tissue has taken on the hypertrophic type, and where the nose is not continuously occluded by the swollen tissue, but from repeated slight colds and irritation within the nose, the nasal opening is at times occluded, the electro-cautery, properly applied, gives the most comfortable and most certain relief. A line of destroyed tissue will decrease the circulation, will bind down a portion of the tissue, and not only relieve the stenosis, but inhibit the nasal nutrition. It is necessary, in some cases, to make more than a single line of destruction, and thereby shut off the blood supply. Such cases will sometimes be increased as time goes on, and the operation may be again demanded, but no class of treatment gives as good results and promises so well as this.

I wish especially to speak, however, of an operation that is of more recent date, and which I have performed many times with the most gratifying results. There are many conditions and changes requiring this operation—a class

of cases in which a large and extensive hypertrophy has increased the whole of the turbinated body. The nose is continually filled by this hypertrophic tissue, causing a more or less complete nasal stenosis on one or both sides.

In such cases, as a rule, the nasal opening was not normally large, so that a moderate degree of hypertrophy caused a complete stenosis.

Another type of cases in which the nose was normally thin transversely, the inferior turbinated bone being broad, and standing almost vertically in the nose. In these cases the opening was normally too small, and but a moderate degree of catarrh completed the stenosis.

Another form requiring this procedure is where the septum, bending at one side, closes the nasal space to such a degree that there is but little room for the turbinated bone and body. Such cases most frequently are complicated by hypertrophy of the turbinated body on the opposite side, but relief of the stenosed side is always to be desired.

The condition of malformation, in which the arch of the palate is extremely high, filling up much of the nasal space and crowding against the turbinated bodies, also requires the operation of which I shall speak.

In all of these cases catarrh is an important feature, and gradually completes the stenosis, which was formerly congenital. On that account, such operations are not common in children, as hypertrophic changes are not often found in early childhood.

The operation consists in removing a portion of the inferior turbinated bone, together with the tissue covering it. This is performed through the anterior nares, after completely anæsthetizing the parts with a ten per cent. solution of cocaine, the nasal saw being inserted well underneath the turbinated and placed in such a position as to sever the proper amount of bone and nasal tissue. The amount to be removed is guided by the judgment of the physician, and depends much upon the condition for which the operation is performed. It is sometimes necessary to saw straight upward, and at others horizontally and at different angles, in

proportion to the degree of stenosis and the shape of the nose. The saw should always cut on the pull and be small enough to turn easily under the turbinated body.

After the bone has been sawed through, the soft tissue is separated with the nasal scissors and the piece removed with the forceps. It is not always easy to separate the posterior portion of the soft tissue, and often much time is lost in removing the bodies.

As there is a copious flow of blood at this time, the necessary manipulation is not always easily performed, and a few times I have found it necessary to abandon the removal of the piece until a later sitting in those cases in which the septum was so deflected that the piece was entirely out of view: indeed, in a single case I was compelled to administer chloroform in order to remove the piece from the posterior nasal region, behind the deflected septum. Much care should be used in separating the soft tissue, to cut well backward through the soft tissue and not leave remaining in the posterior nasal space the large hypertrophic growth that is so often found at the posterior end of the turbinated. Should this tumor be left in the nose, a serious hemorrhage is liable to result, unless post-nasal plugging be resorted to. The hemorrhage, immediately after the operation, is usually quite copious, but, as a rule, is not alarming. The cocaine has depleted the tissues to such a degree that unless same hemorrhagic tendency be present, the bleeding is not excessive. A properly applied plug prevents loss of blood after the cocaine has passed away and no serious consequences result.

In a few cases, however, the hemorrhage is extreme, and in five cases on which I have operated it became dangerous. In one, it did not occur for a week after the operation, and in the others took place immediately after. Plugging the nose with the anterior plug was not sufficient in these cases to avoid serious depletion and post-nasal plugging was resorted to, but the flow was so copious that before the plug could be applied the patient had fainted from loss of blood.

The tendency to hemorrhage in these cases remained for a

week and only by continual care were serious consequences avoided.

The after treatment consists of plugging the nose with carbolized calendula cerate for a week, removing the dressing after two days and thereafter daily during the time.

Very great care is necessary in removing the cotton pledget at the first sitting in order to avoid fracturing the eschar and producing hemorrhage. Patient spraying of the nose will finally soften the adhesive clot and allow the plug to be removed without danger.

The length of time required for the healing is from three to four weeks, when the mucous membrane will be wholly restored and the nose assume a normal appearance.

It frequently happens that excessive granulation takes place in the wound and requires removal by the electro-cautery or scissors. I have seen the nose completely closed by this granulation, requiring a second operation for its removal.

The object attained by the operation is a free and unobstructed nasal passage, removal of the large mass of hypertrophic and secreting tissue covering the turbinated bone and the proper drainage of the nasal fossa.

This operation should not be performed during an acute attack of catarrh or in those subjects liable to acute inflammation of the middle ear or mastoid cells, as it sometimes happens that inflammation of the middle ear follows an operation on the nose. A moderate degree of fever may take place on the second and third day from irritation of the nasal nerves or an inflammatory change from taking cold. Tonsillitis not infrequently follows the operation, if the patient is exposed in any manner.

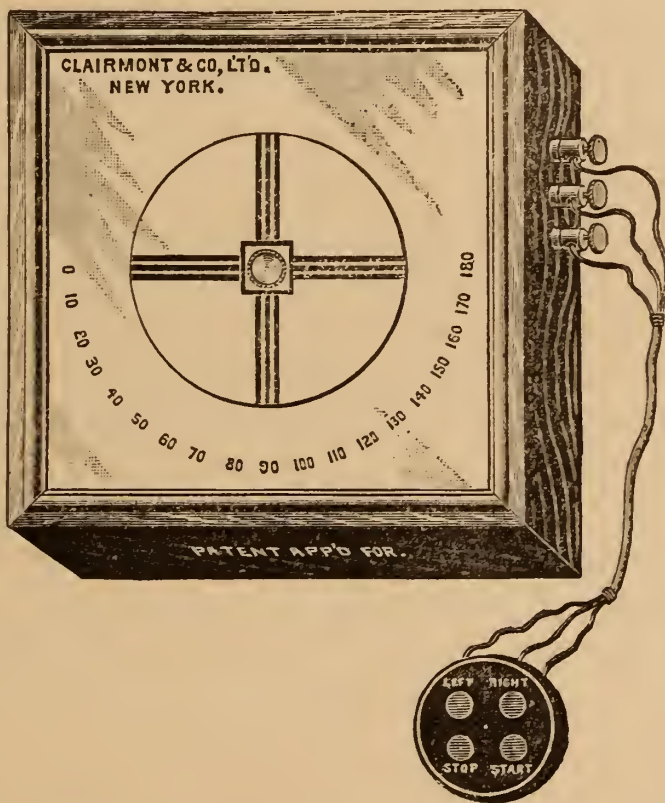
The operation should not be performed in the physician's office and the patient permitted to expose himself immediately afterward. It is my custom to keep the patient in the house for five or six days, thereby avoiding the risk of inflammation or other serious complications.

In more than two hundred cases, I have not yet seen a case that was not markedly benefited by this operation, and in none have I been disappointed in the results.

THE ASTIGMADICT.

BY C. C. BOYLE, M. D., NEW YORK CITY.

This instrument, as its name indicates, is to detect or point out astigmatism when it exists. The test used is the well known one of three dark lines on a revolving disc; it is not this that is claimed as a new method, but it is the mechan-



ism by which the revolutions of the discs are controlled. This apparatus, as will be seen by the cut, consists of a square box 13 x 13 in., the face being of white cardboard having on it a semi-circle marked off in degrees from 0 to 180°; in the center is a small opening through which a shaft passes

on which the discs are fastened, and which is connected with clockwork within the box. These discs are three in number, each having three black lines running horizontally and three vertically, the width of the lines varying on each disc, which renders it possible to make a finer or coarser test according to which disc is used. The box is either fastened on the wall or can stand on a table; is connected with a one cell Le Clanché battery by means of wires running from the battery and keyboard to the three binding posts on the side of the box which conduct the current to the magnets within, whereby we are enabled by means of the keyboard with four buttons on it, to start the discs revolving, stop them, make them revolve to right or left, according to which button is pressed; they being marked "Start," "Stop," "Right," and "Left." In the clockwork is used a long and powerful spring, which will run a long time before requiring rewinding. In starting it, press the "Start" button, which causes the current to act on the magnet that removes the obstruction from the clockwheel, and the wheels are set in motion by the power of the spring causing the shaft on which the discs are fastened to turn. If it is going to the right, press the button marked "Left," and it will revolve to the left, or vice versa. This is accomplished by magnets and extra cogwheels made of brass. When wanting to stop it, press the button marked "Stop" and it stops. This is a much easier method of controlling the motions of the revolving discs than the old way of turning them by hand or by means of cords and pulleys, and, in the revolving discs with the lines on, I consider that we have one of the finest tests for discovering astigmatism.

SYMPATHETIC IRRITATION AFTER THIRTY-FIVE YEARS, FROM A LENS DISLOCATED INTO THE VITREOUS.

BY G. C. McDERMOTT, M. D., CINCINNATI.

Wm. E., aged forty-five ; occupation, farmer ; a large, powerful man, weighing two hundred pounds, presented himself for examination and treatment for inflammation of the right eye, which had been blind for thirty-five years. There was also an inability to use the left eye, which had been perfectly healthy all his life until the last four months.

He had divergent squint of his right, or blind eye, and a pronounced conjunctival and subconjunctival congestion, pupil quite fully dilated, a plus 2 tension, great tenderness over ciliary body or region, not any perception of light, anterior chamber very shallow, and presenting at the lower part of the pupillary space in the vitreous, a white mass the size of a cherry pit. This white object was movable as the eyeball was rolled up and down. By oblique illumination it was clearly discernable to be the crystalline lens yet in its capsule and of a pearly whiteness.

The left eye was very sensitive to both artificial and natural light, and required very dark glasses to endure any light. At any attempt to fix the sight upon an object there was great photophobia and lachrymation. The vision of the left eye however, was $\frac{20}{80}$.

The patient had been unable to read for four months, as any attempt to read was followed by pain, lachrymation, photophobia, and a redness of the conjunctiva.

He gave the following history of an accident which occurred at the age of ten : While playing at ball, he was struck in the right eye. From the time of the accident, his sight in the eye

was greatly impaired. No pain nor inflammation, as far as he can recollect, followed the accident.

At the age of eighteen, while attending the Miami University, he recollects that the sight was lost. Since leaving the University he has been engaged in farming. During the past twenty-seven years the eye gave him no trouble. In October, 1891, the eye began to inflame, was very tender to touch, and pains of a dull heavy character were in the eye and corresponding side of the face and head. This attack lasted some ten days or two weeks, when all pain and irritation subsided. Since then, there have been repeated attacks of a similar character, until the last one, some six weeks before the call for examination, which has existed uninterruptedly, and now the suffering, irritation, great tenderness to touch cause him to seek relief.

The left eye began having symptoms of irritation and sympathetic trouble four months ago. For the past three months he has not read or used the eye for any near work, and only going out with a pair of dark glasses. The diagnosis was cyclitis and secondary glaucoma in right eye from the dislocated lens and sympathetic irritation in the left. The eye was enucleated. An examination of the contents of the eyeball revealed a lens cataractous by calcareous degeneration, resting upon the ciliary body, the vitreous fluid, and degenerated changes in choroid and retina.

Immediate relief followed, the sympathetic symptoms subsiding within a few days.

The interesting feature of the case was the length of time existing between the dislocating of the lens, at the age of ten years, and the development of the inflammation followed by sympathetic trouble, viz., thirty-five years.

PARALYSIS OF THE MUSCLES OF ONE EYE FOLLOWING AN INJURY TO THE OTHER.*

BY C. H. HELFRICH, M. D., NEW YORK.

Alfred A., age forty-three, presented himself at the New York Ophthalmic Hospital for treatment on December 26, 1891.

On the previous day, during a quarrel, he was struck in the right eye with the ferrule of an umbrella, producing a lacerated wound of the lower lid at the inner canthus.

Judging from the appearance of the wound the direction of the force was probably inward and backward. Severe swelling of the lids ensued, which at the time of the examination crepitated on pressure, showing the presence of air in the tissues.

A careful search failed to detect any fracture of the bone, though the swelling greatly handicapped our efforts to detect one. This crepitation disappeared in a few days.

On separating the lids of the right eye all the muscles excepting the ciliary were found to be partially paralyzed, producing a slight exophthalmos.

His vision was normal, and the ophthalmoscope failed to reveal any trouble in the fundus.

The remarkable feature of the case, however, was a complete paralysis of all the muscles excepting the ciliary of the uninjured eye, producing ptosis and complete immobility. None the less remarkable was a slight contraction of both pupils, the contraction increasing on exposure to light and during convergence. Instillations of eserine also produced a further contraction.

The effect of atropine was not tried on account of the inconvenience it would cause the patient.

* American Institute, 1892.

Paralysis of the sympathetic in the cortex, due to the shock, seems to me to offer the best explanation of the conditions.

An ice bag was applied over the right eye for several days, until the swelling disappeared.

Caust. 3 was given internally, and occasionally the faradic current was applied over both eyes.

His last visit to the hospital was on March 5, when the paralysis had all disappeared, with the exception of a slight loss of power of the left external rectus.

THE PATHOLOGY OF DETACHMENT OF THE RETINA, BASED ON DEDUCTIONS DRAWN FROM LATE RESEARCHES ON THE FUNC- TION OF THE UVEAL GLAND.*

BY H. H. CRIPPEN, M. D.

The term "uveal gland" is of so recent origin that an explanation as to the parts which compose it will be necessary to a complete understanding of the rôle played by its action in detachment of the retina. Nearly the whole of our knowledge of this subject has been presented by Dr. W. Nicati, of Marseilles, and all of the deductions which follow are based upon his latest researches.† Previous to his work the secretion of the aqueous humor was attributed to the epithelium of the posterior surface of the iris and of the ciliary body. However, Nicati has enlarged upon the opinions of the earlier authors, and now considers the anatomical factors that are endowed with this secretory function as constituting a special gland, on which he bestows the name uveal gland.

In the anatomical study of this gland, there present the following parts:

1. An epithelium ;
2. The attachments of this epithelium ;

* Presented in the Bureau of Anatomy, Physiology, and Pathology, during the forty-fifth session of the American Institute of Homeopathy, held at Washington, D. C., June, 1891.

Since the presentation of this paper, the author has added the pathology of glaucoma, as founded upon the physiology of the uveal gland.

† "La glande de l'humeur aqueuse, glande des procès ciliaires," *Archives d'Ophthalmologie*, t. x, p. 481, and t. xi, pp. 24 and 152.

3. A capillary plexus ;
4. The arteries and veins in relation with this plexus ;
5. A muscular apparatus ;
6. A nervous apparatus ;
7. The secretory ducts delivering the aqueous humor at the pupillary orifice ;
8. A reservoir, the anterior chamber, with an excretory apparatus, the iris, which absorbs and carries away the products of secretion.

1. The structure of the two epithelial layers, continued from the ora serrata over the posterior surface of the iris, is well known. It is, therefore, sufficient to remember that it is the internal layer of cylindrical cells that constitutes that portion of the uveal gland which elaborates the aqueous humor from the material furnished by the capillary plexus external to it. The analogy of this layer of cylindrical epithelium with that lining other glands is well marked.

2. Externally, the epithelium of the uveal gland is in relation with a capillary plexus ; internally, Nicati gives us the following summary of the attachments:

(a) A thin membrane covers the epithelium, but is attached very loosely by fine fibrillar prolongations, having intervals for the circulation of the aqueous humor. This may be called the external limiting membrane of the ligament.

(b) From this membrane arise rigid fibers that follow the limiting membrane to the capsule.

(c) Between the external membrane and these rigid fibers is found the third element of the ligament, an axis of loose connective fibers.

3. The plexus of capillary vessels covering the layer of cylindrical epithelium will be recognized as the expansion of the chorio-capillary membrane. In *résumé*, this portion of the uveal gland may be regarded as a double membranous sac, represented by the lamina vitrea internally and Sattler's layer externally, containing the capillary plexus which lines the whole of the interior of the eyeball, and opens anteriorly to receive the body of the gland. The lamina vitrea is absolutely continuous, according to Nicati, and prevents

exit of liquids on the retinal side. The external lamina is only permeable for the perivenous lymphatics, and this during embryonic life only, since these disappear at birth. From this moment, that is when the gland begins its functional activity, the external lamina is, also, impermeable. If, then, serum transudes through the capillary walls, it finds no passage in the walls of the sac and is obliged to circulate between them. Therefore, the flow of serum can only take place anteriorly, where the lamina vitrea disappears and where the sac opens on the glandular epithelium.

4. The disposition of the long and the short posterior ciliary arteries does not necessitate description, neither shall we dwell upon the course of the venous vessels. It will be essential, however, to bear in mind that the arteries have a tortuous course in the choroid, and pass through it very obliquely, while all the veins traverse this membrane in a much less oblique manner.

5. The unstriped muscular fibers, existing in the external layer of the choroid, are evidently in relation with the secretory function of the uveal gland; for, in a state of contraction, they cause a venous congestion of the chorio-capillaris, by reason of the disposition of the blood vessels above noted, and thus produce an increased transudation of serum.

6. The nervous apparatus in relation with the uveal gland is very extensive. In *résumé*, Nicati gives it as consisting of terminal fibers, sensory and motor, from the intra-ocular ganglionic plexus, from the ciliary nerves, from the ophthalmic ganglion, and from its triple origin (trigeminal, oculomotor, and sympathetic).

7. The excretory ducts are :

- (a) Petit's canal;
- (b) The posterior chamber;
- (c) The communications between these by the interstices of the processes.

8. The reservoir of the aqueous humor is represented by the anterior chamber.

The excretory, or the absorption passages, are furnished

by the anatomical peculiarities of the surface of the iris, for the structure of this membrane is very like that of a sponge. Not only do we find on its anterior surface numerous crypts, at the bottom of which the epithelial covering presents lacunæ (lymph fissures of Fuchs, stomata of Nuel and Cornil), but beneath the epithelium there is a sponge-like network, described by Nicati as communicating with a deeper lymphatic plexus, and terminating in circumvenous lymph spaces. Thus, the anatomical passages indicated for the absorption of the aqueous humor are: The lymph fissures and lacunar spaces of the iris and the perivenous lymphatic passages, terminating in the vasa vorticosa, in the posterior ciliary veins and in the anterior ciliary veins.

In this necessarily short paper, it will be impossible to detail the varied experiments on which Dr. Nicati has founded his conclusions. For his processes of reasoning, I must refer you to his work in the *Archives d'Ophthalmologie*, t. x., p. 481, and t. xi., pp. 24 and 152.

But, in connection with the anatomical data given above, there may be presented the following physiological points:

1. The cylindrical epithelium of the ciliary processes and of the posterior surface of the iris does not constitute a mere filtration membrane, through which the serum of the blood passes by osmosis, but it is to be regarded as a glandular structure, endowed with physiological functions which enable it to produce a true secretion, the aqueous humor.

2. More than this, the glandular structure of which we speak is under the control of a special nervous mechanism, analogous to that controlling the secretory processes of other glands.

3. This nervous mechanism is composed of four portions.

- (a) The terminations of the sensory nerves in the cornea, capable of recognizing a rupture of the equilibrium between the intra-ocular pressure and the blood pressure.

- (b) An inhibition center placed for a small part in the Gasserian ganglion, and for the most part in the bulbus.

- (c) A center of secretory energy, the ophthalmic ganglion.

(d) Finally, there is an accessory regulating apparatus residing in the sympathetic nerve and in the iris.

When diminution of intra-ocular pressure occurs, from puncture or any other cause, it is perceived by the cornea; this impression, transmitted by the direct ciliary nerves and by the trigeminal, to the Gasserian ganglion and to the ganglia of the bulbus, interrupts the inhibitory activity of these centers and sets at liberty the energy of the ophthalmic ganglion, that is to say it causes secretion.

We are now in position to speak of the relation of histology and physiology of the uveal gland to the pathology of retinal detachment.

On the theory of progressive detachment of the retina by the aqueous humor, Dr. Nicati reasons as follows:

The vitreous is in a changed condition: it has become liquid. Under the influence of the night's repose, of the weight of the eye and of the eyelids a portion of it is absorbed during sleep by the lymph spaces, which follow the terminations of the central vein and artery of the retina. On awakening, the eyelids open; the patient lowers his head or turns it against the pillow; the eye is as if suspended and, by this fact, is subjected to a sudden depression of tension. To this depression the uveal gland responds by an abundant reflex secretion. What becomes of this fluid?

Can it push the lens backward? This is impossible. The only extensible structure is Petit's canal. The hyaloid membrane is pushed backward so strongly that it yields, dragging with it the ora serrata of the retina. Henceforth, the aqueous humor is able to insinuate itself into the loose space between the epithelium and the layer of rods and cones.

If this process of reasoning be exact it will be possible to produce artificial detachment of the retina by an injection of liquid into the anterior chamber of animals. As a matter of fact, Nicati has succeeded in producing in animals a definite detachment of the retina by simple injections of water, introduced into the anterior chamber by an hypodermic syringe.

In man he has also succeeded in proving the existence of a communication between the posterior chamber and the sub-retinal effusion. In patients affected by detachment, puncture of the anterior chamber was followed by immediate reapplication of the retina, a proof that the cavity beneath the detached membrane had been evacuated simultaneously with the anterior chamber.

The following facts are also in support of this theory:

1. The constant seat of progressive detachment in the anterior region and its course from before backward.
 2. The existence of a communication between the liquid of the detachment and that of the anterior chamber, demonstrated by the presence of cholesterin crystals in both.
 3. The very frequent production of detachment in the morning on awakening.
 4. Finally, the liquid state of the vitreous so often demonstrated by autopsy.
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In addition to detachment of the retina, Nicati dwells strongly on the pathology of glaucoma as being in close relationship with disturbances in the normal action of the uveal gland.* In reviewing this question in the light of the new physiology advanced by this author, it will be fair to him to quote in abstract the opinions and arguments presented in favor of his theory. Thus, for Nicati, the pathology of glaucoma would rest upon the following factors:

Retention of the aqueous humor (glaucoma) may be produced by two causes:

1. By obliteration of the passages by which the flow of the aqueous humor arrives in the anterior chamber, posterior chamber, and pupil (pupillary occlusion).
2. By default, obliteration, obstruction, or insufficiency of the excretory passages of the anterior chamber, lymph res-

* The notes on glaucoma, which follow here, were introduced since the presentation of this paper before the A. I. H., and for that reason do not appear in the headlines.

ervoirs of the iris, lacunar canals of this membrane (impermeability of the iris).

I. RETENTION BY PUPILLARY OCCLUSION.

(a) *By persistent congenital pupillary membrane.*—Let us suppose a complete persistent pupillary membrane, preventing the issue of the aqueous humor through the pupil. In this case, there will arrive a time at the moment when the uveal gland begins its secretion—that is, some weeks before birth—when there will be noted the facts given in the following observation :

This observation relates to a cat, three months old, presenting enormously projecting corneas, somewhat opaque, a true buphthalmia.

The eyes having been enucleated, one of them (the other was unfortunately destroyed before the autopsy) presented in section, after hardening in ammonium bichromate, the following peculiarities :

Anterior chamber of normal depth, aqueous contents with very slight albuminous deposit.

Iris normally tense.

Pupil entirely closed by a continuous membrane, extending from the small circle of the iris forward and beyond the pupillary margin.

Behind the iris, a posterior chamber, occupying alone half the volume of the eye. The walls were limited laterally by the very thin and elongated ciliary process, posteriorly by the crystalline.

Its contents were also aqueous, with very slight deposit.

Next came the crystalline lens, surrounded by the ligament, stretching from its equator to the ciliary crests, while between the hyaloid and the ligament appeared a space, the dilated canal of Petit, filled with aqueous humor.

Behind this space and behind the crystalline was the vitreous in a healthy state, as well as the other ocular membranes.

The characteristic of this observation is, the monstrous distention of the posterior chamber at the expense of its lateral wall, with maintenance of the lens in place ; a

marked distention of Petit's canal and conservation of the anterior chamber. Such are the signs of retention of the aqueous by simple pupillary occlusion. They are rendered particularly manifest by the suppleness of the tissues inherent to infancy.

(b) *By adhesion of the iris to the lens capsule.*—This is of frequent occurrence. I remind you of the classical signs: pain, pericorneal venous injection, tension, pushing forward of the iris. The iris takes a funnel-like shape, the lens remaining behind with the pupillary margin attached to it. There is accumulation of aqueous humor behind the iris, distention of the ocular tunics at this point, finally distention of Petit's canal. The funnel-shape of the iris is particularly diagnostic of this condition.

2. *Retentions by impermeability of the iris.*—We have seen that the rôle of absorbing the aqueous humor devolves, for a very great part, on the iris, a veritable sponge with large lymph openings on its anterior surface. When this sponge does not perform its function, by reason of congenital insufficiency, atrophy, or from other causes, there necessarily results a retention of aqueous humor.

(a) *Congenital insufficiency of the iris.*—This gives the history of anterior congenital hydrophthalmus without pupillary occlusion. From the first days after birth, the cornea projects and enlarges in all directions at the same time that it becomes thinner. Diffuse opacities appear and extend to all the surface or are circumscribed to some extent. The scleral border is likewise thin and appears bluish by its transparency.

The anterior chamber is extraordinarily deep.

The iris is atrophied, of grayish color. The pupil is parietic or even immobile, of medium size or strongly dilated.

The posterior chamber is very deep, a fact to which the constant tremulousness of the iris testifies.

The intra-ocular tension is high and the papilla regularly excavated.

The vision diminishes, but may remain to a considerable

extent for years; at the end, the eye becomes cataractous and sometimes atrophied.

Manz, from whom the elements of this description were taken, particularly insists on the state of the iris, which appears not only atrophied, but as if "dead," and several observations of Muralt support this. Without doubt, it can be sustained that this atrophy of the iris is secondary and due to long continued pressure, but there are cases of chronic glaucoma of very long standing in which this atrophy is entirely absent.

(b) *By progressive atrophy of the iris.*—The following is illustrative of this condition: The subject is still young and there is not the enormous dilatation of hydrophthalmus, but simply the picture of glaucoma with a deep anterior chamber.

An emmetrope of thirty-four years has complained for a year and a half of his right eye; colors around the light with tension about the root of the nose; $V. = \frac{1}{3}$, diminishing to $\frac{1}{6}$ during the exaggeration; visual field normal; tension exaggerated; characteristic opacity of the cornea. In sum, all the signs of glaucoma, but with the anterior chamber not only preserved but clearly increased in depth.

On the iris were first manifested some dark spots; by degrees a progressive atrophy evolved at these points; the anterior leaflet of the membrane disappeared and left the pigment bare. Finally the pigment disappeared, and, in the upper part, where the atrophy advanced the most rapidly, the iris was only connected to the ciliary border by bands separated by a series of orifices. The fundus of the eye appeared to the ophthalmoscope through these orifices.

At the same time, the eye became very tense; the anterior chamber increased in depth, and the sclera became bluish around the cornea.

Two sclerotomies and an iridectomy, performed in rapid succession, were without effect. Rapid re-establishment of the anterior chamber after sclerotomy was noted. Papillary excavation was absent.

(c) *By inflammatory engorgement of the iris.*—Hypertony

in the course of iritis is not rare. It may be attributed to occlusion of the absorption passages in the iris by the products of inflammation.

(d) *By reduction of the absorption surface by means of atropine.*—Atropine, by dilating the pupil, considerably reduces the extent of the anterior absorbing surface of the iris.

(e) *By senile or by arthritic insufficiency.*—As surely as there exists a senile cataract, so is it certain that there exist a senile glaucoma and an arthritic, or a gouty glaucoma. Without doubt, imperfect performance of the function of the iris is the fundamental cause, but it is not the only one. In ordinary circumstances a senile or gouty iris is sufficient for excretion, but it does not suffice when the secretion is exaggerated by some of the causes which we have now to examine.

Excitations of the iris cause attacks of glaucoma. Œdema of the chorio-capillaris.—Let us recall, first, the anatomical disposition of the uveal arteries, which protects them from pressure during contraction of this membrane, while the veins are exposed to strangulation during their exit by reason of their straight course. Also that the entire chorio-capillaris* participates in the elaboration of the aqueous humor by the production of a sort of reflex physiological œdema, which must be attributed to compression of the veins by the contracted uvea. Finally, that irritation of the iris accelerates and exaggerates the secretion of the aqueous humor.

*I find it necessary to remind you that erroneous views, as to the function of the chorio-capillaris, are held by some authors. Notwithstanding the latest researches, it will be found that Noyes, in his recent work, "Diseases of the Eye," New York, 1890, asserts that the capillary layer of the choroid (the chorio-capillaris) is destined for nourishment of the external portion of the retina (*vide Choroidea*, p. 524). As a matter of fact, the external portion of the retina, its sensory part, is nourished by imbibition of serum supplied by minute branches from the *arteria centralis retinae*, which penetrates as far as the internal granular layer. It is also to be remembered that Nicati has demonstrated that the lamina vitrea is absolutely impervious, even by the serum of the blood.

Our experiments of teasing the iris being accompanied by a large opening into the anterior chamber, the œdema of the chorio-capillaris found issue in the secretion itself, and did not increase the tension. Surgical operations in man are likewise powerless to increase the tension in an intense and durable manner, even when the anterior chamber is not largely opened (discission), provided that the subject is young, and that the absorbing function of the iris be normal. It is quite different when the excretory function of the iris is retarded by age or by other conditions.

Here follow examples of traumatic irritation of the iris with subsequent glaucomatous attacks :

A woman of seventy years, having been operated on for cataract, presented opaque remains attached to the capsule, with iritic adhesions. Discission was performed with the needle, exerting on the iris, by the intermediate adhesions, energetic and repeated tractions. The following night occurred a very violent and painful attack of glaucoma, accompanied by vomiting. This condition yielded to a simple puncture of the anterior chamber.

Man of seventy-four years operated on for cataract by a normal incision of the cornea, having the iris occluded in the wound, was attacked by an acute glaucoma, very painful and violent, eight days after the operation. (Such accidents are not observed in cataract operations after oblique incisions of the cornea, which permit separation of the lips of the wound and allow a flow of the excess of aqueous when produced by prolapse of the iris.)

The increase of pressure in these cases is especially to be attributed to the œdema of the chorio-capillaris. Human anatomy is perhaps powerless to demonstrate an essentially temporary œdema of the chorio-capillaris, but, in default of this, the ophthalmoscope furnishes us with proof in the varicose dilatation of the vessels belonging to this layer of the choroid.

Other causes of excitation of the iris may produce the same effect as traumatisms.

I have seen the exaggerated instillation of eserine produce an attack of glaucoma.

Iritis is a possible cause of excitation.

Efforts of accommodation are also to be cited. We know that accommodation is accompanied by pupillary contraction. It will also be understood that the contraction of the cilio-choroidal muscle, synchronal with accommodation, is capable of producing by itself a certain degree of œdema of the chorio-capillaris. Statistics accord with this in showing that glaucoma is much more frequent in hypermetropes than in emmetropes or myopes.

A last cause of excitation of the iris is, without doubt, the prolonged action of an intense light.*

Every increase of pressure causes œdema of the retina and vitreous. It is important to note that every exaggeration of intra-ocular tension has a tendency to produce a venous stasis in the retina, and in its appendage, the vitreous humor, a species of strangulation having, as a consequence and corollary, an œdema of this membrane and of the vitreous. In other words, that every excess of tension causes posterior hydrophthalmia. The proof of this is to be seen in the dilatation of the veins, observed with the ophthalmoscope under the pressure of the finger, in the peri-papillary retinal halo, the companion of glaucoma, and, finally, in the papillary excavation noted in the most marked cases of retention of the aqueous humor.

From the above abstract of Nicati's views on the pathology of glaucoma, to which I have added some original ideas, it will at once be seen that here is a theory affording

* May we not trace some cases of photo-electric ophthalmia to an increased secretion from the uveal gland, reflexly excited by the prolonged action on the iris of the intense rays of the arc light. The symptoms of the sudden increase of intra-ocular tension certainly correspond in many particulars to those reported in some cases of ophthalmia due to prolonged exposure to the electric light. Thus we have, in both, intense periorbital and orbital pain, lachrymation, palpebral œdema, and injection of the conjunctiva. However, the symptoms of photo-electric ophthalmia are usually of such ephemeral nature that reports on this subject are not exact.

Even Lubinsky's theory of lesions of the corneal filaments in photo-electric ophthalmia seems to bear some relation to the secretory processes of the uveal gland, for Nicati demonstrates that the nerves of the deep layers of the cornea constitute a peripheral seat for the initiation of the reflex.

satisfactory explanation of nearly all the previous facts and opinions on the nature of glaucoma.

Taking glaucoma in two great classes, *primary* and *secondary*, it at once becomes evident that Nicati's view will afford *direct* explanation of the phenomena of the latter form, whether due to pupillary occlusion, or to some other purely mechanical interruption of the excretory passages of the uveal gland.

Then, as to *primary glaucoma*, the theory of disordered function of the uveal gland may be broadly taken as the initial pathogeny, from which may be deduced conclusions capable of forming a common groundwork, upon which we can harmonize (by modifying) the following apparently conflicting opinions: *

1. *The cause of the exaggeration of tension is due to an hypersecretion, the consequence of choroiditis* (Graefe).

2. *The increase of pressure is due to an increase of the contents of the bulbus, by interruption of the filtration passages.* (Scleral changes, adhesion of the periphery of the iris, swelling of the ciliary processes, large-sized lens, senile iritic changes, including atheroma and arterio-sclerosis, blocking of the inter-vaginal space of the n. o., atrophy of anterior choroidal vessels, occlusion of the pericorneal trabecular tissue, and of Schlemm's canal, etc.)

3. *Glaucoma is the consequence of a neurosis of the secretory nerves of the eye* (Donders).

Concerning the last opinion, it must be said that Nicati's experiments, even though still incomplete, on the nervous mechanism governing the secretory processes of the uveal gland, afford us a wonderful insight into the manner in which the reflex influences produce increased intra-ocular tension, and that it is now impossible to ignore neuropathic factors in formulating the pathogeny of glaucoma.

I have neither time nor space to arrange these various opinions and pathological facts in harmony with Nicati's

* Here, I intentionally ignore Haensell's theory of hyaline degeneration of the vitreous as a cause of glaucoma, for the reason that this alteration appears to be secondary rather than primary.

theory, but I have endeavored to place at the reader's disposal such data as will enable a rearrangement of the whole pathology of glaucoma.

In *résumé*, these data are :

The aqueous humor is secreted by the *uveal* gland. This gland is composed of an epithelium (pars ciliaris retina), of a vascular and serous reservoir (the chorio-capillaris), of a contractile apparatus (the cilio-choroidal muscle) which accumulates the blood in the reservoir.

This secretion passes into the anterior chamber by means of Petit's canal, the intervals of the ciliary processes and of the suspensory ligament, the posterior chamber, and the pupillary opening. From the anterior chamber it is absorbed by the lymphatic openings of the iritic tissue.

The nervous mechanism of this gland consists of a center of secretory energy, incessantly in action, but held in control by an inhibition apparatus. The reflex, that is, secretion, occurs, whenever inhibition is suspended, either automatically when the influence of the bulbar ganglia is removed, or directly when the action of the trigeminal nerve is suspended. Excitations of the iris and isolated paralysis of the ocular vessels (removal of vaso-motor influences) hasten this reflex and exaggerate it.

A mere glance at this physiological arrangement teaches us that the factors in the pathology of glaucoma may be multiplied almost indefinitely, and that it should no longer be a matter of astonishment that so many and varied theories have arisen.

HYOSCYAMINE HYDROBROMATE-- $C_{17}H_{23}NO_3$, H BR.*

BY JOHN L. MOFFAT, M. D., BROOKLYN.

Oculists and their patients are indebted, in a marked degree, to Dr. N. L. MacBride for his valuable paper presented to this society a year ago last September,† suggesting that, for the purpose of testing refraction, the instillation of a single drop of one per cent. aqueous solution of hyoscyamine hydrobromate will promptly paralyze the accommodation, even in cases of marked ciliary spasm, and that the effects of this drug pass off more rapidly than do those of atropine.

My experience for the past eleven months corroborates this and relegates atropine (for this purpose) entirely to the background. Even after the development of a heavy fungous growth, an old solution of hyoscyamine hydrobromate is effective yet non-irritating. I have not used it in any aged people—my patients were from five to forty-one years old—and have seen no bad effects. Two patients, who were subject to vertigo, spoke of having a little while they were being examined.

In three cases I noticed that the pupil dilated irregularly, being oval at about 75° or 80° with the iris broader in the outer quadrant. The first had compound hyperopic astigmatism, axis 90° ; the second, simple hyperopia; and the

* Read before the New York State Homeopathic Medical Society, February 9, 1892.

† "Hydrobromide of Hyoscyamine," Transactions of New York State Homeopathic Medical Society, 1890, p. 319.

third showed compound myopic astigmatism, axis 75° . In the first two the pupil became perfectly round with complete dilation, but in the last—with a history of inflamed eyes—there were posterior synechiæ.

In several cases of spasm of the accommodation (equally divided between compound hyperopic and compound myopic astigmatism) although complete mydriasis was observed in about fifteen minutes, the ciliary muscle was not entirely quiescent during the examination; the glasses prescribed, however, afforded the desired relief. In a few instances this incomplete paralysis I ascribed to the patients' jerking the head away and forcibly closing the eye before the drop was well absorbed.

Usually I began testing the refraction about thirty minutes after the instillation, but have been able to do so in some cases in a quarter of an hour.

I have prescribed glasses on the fourth day, but more frequently on the fifth or seventh, and sometimes as late as the twelfth. One or two patients complained that the effects of the drug persisted for a week, so I soon ceased predicting that they would be all right in five days, but told them to return when the pupils had resumed their former size.

Dr. MacBride calls this drug the *hydrobromide* of hyoscyamine, but there does not seem to be any warrant for such a hybrid term. The proper name is the *hydrobromate*, in accordance with the well established rule that "*-ic* acids form *-ate* salts." A bromide is a binary compound where the hydrogen of hydrobromic acid has been replaced by an element (as sodium) or a basic radical (as ammonium). Analysis shows that there is no such substitution in the salts of the alkaloids. While we are yet in the dark as to the graphic formulæ of alkaloids we do know the definite amounts of the various elements entering into their composition; we know, for instance, that while there are twenty-three atoms of hydrogen in a molecule of hyoscyamine, its hydrobromate has twenty-four. If the latter had but twenty-three there might be ground for calling it the bro-

mide, but even this is more than doubtful. However, terminology aside, I am glad to add my testimony to the value of this new help in the determination of refraction and to commend it to the consideration of those who have not yet tried it.

“ Be not the first by which the new is tried,
Nor yet the last to lay the old aside,”

is sound advice for the masses, but there must be some “first” or we would have no progress; and as Dr. MacBride has that honor in this instance it only remains for the rest of us to act upon the second line of the couplet.

BOOK REVIEWS.

MÉMOIRES ET OBSERVATIONS D'OPHTHALMOLOGIE PRATIQUE.
Par le Docteur H. ARMAIGNAC. FELIX ALCAN, Editeur, Paris,
1890.

During the past few years we have been fortunate in noting the publication of an unusually large number of excellent text-books on diseases of the eye. These works all contain more or less extended details on those ocular diseases that are already well known, but unfortunately they are obliged to follow a conventional routine in confinement to generalities. The present work from Dr. Armaignac, represents a refreshing exception to this general rule. It contains a valuable fund of practical observations and of rare clinical cases, with philosophical reflections, that are in themselves an index of the author's long training in this specialty.

These observations are classed in distinct chapters, by organs, and the reader will easily find any subject to which reference is desired. Without pretension to a "treatise on diseases of the eye," the author touches upon the study of a great number of diseases that are among the most interesting or the most important, and always giving an unprejudiced opinion with good faith and sincerity.

In the first chapter we find some excellent advice on the treatment of diseases of the lachrymal passages, the author according just weight to the abandonment of the practice of slitting open the canaliculus before introducing the probe. A moment's reflection will show that each time that the incision of the lachrymal canaliculus attacks its internal orifice, whatever the precautions taken to keep the opening large, there arrives a moment when the cicatrix reduces the orifice to a microscopic slit, if it does not obliterate it completely. Still worse, the abnormal orifice, if one remains, is usually placed beneath a fold of mucous membrane,

which acts as a valve and completely closes the opening whenever swelling ensues, as from a cold. The disease then becomes incurable so far as regards the lower canaliculus.

In the second chapter, "*on tumors of the lids, of the orbit and of the bulbus*," we find some interesting reports on congenital symmetrical tumors occurring about the orbit. Such congenital symmetrical tumors are of rare occurrence; probably the first case was reported by Bowman from the Moorfield's Hospital of London, and another case is reported by Dujardin. To these the author adds three new observations from his personal clinic. In spite of what has been reported on this subject of congenital tumors of the lids and orbit the etiology is still obscure, for autopsies have not yet been possible and the operation of removal of the tumor does not permit a deep dissection of the relations with contiguous parts. The hypothesis, with which the author appears to agree, that making them a simple prolongation of the cellulö-fatty tissue of the orbit, has the merit of probability, in view of their histological structure, but it tells nothing of the mechanism of the production of these tumors. The hypothesis of dermoid inclusion appears justified in some cases, but again leaves too much for explanation in other instances. There is also some confusion on the subject of dermoid tumors, for cases of non-symmetrical growths are reported that are indeed doubtful so far as their dermoid nature is concerned. Under the term dermoid cysts or tumors should be described only those growths which manifestly contain the elements of the skin and the products of their secretion.

The third chapter of Dr. Armaignac's work deals with isolated paralysis of the superior rectus muscle. Of this rare lesion, one case is cited. Every classical author has a good description of the disturbances caused by this paralysis, but the symptoms are given chiefly by a simple theoretical deduction, for researches through ophthalmological literature will reveal very few clinical reports. In the case reported by the author, the paralysis of the left superior rectus was absolutely complete, while the levator of the upper lid retained its normal function. The patient enjoyed perfect binocular vision for all directions except when looking upward, and, in spite of the paralysis of the superior rectus, there was not the slightest downward deviation of the bulbus. The inferior rectus performed its function as perfectly as if the antagon-

istic muscle possessed a normal power. This is certainly a matter for comment, giving rise to the query, Is the muscular tonicity sufficient to regulate the contraction of the antagonistic?

We have paused for so many observations on interesting points that it is necessary to pass the chapter on diseases of the lids and conjunctiva without comment. Turning then to Chapter V, "diseases of the cornea, of the sclerotic, of the iris and of the choroid, glaucoma," will be found a considerable contribution to the study of punctate keratitis, or descemetitis. In the author's belief, descemetitis is neither an inflammation of Descemet's membrane, properly so-called, nor a perfectly characteristic morbid entity; on the contrary, he believes it to be an affection that is symptomatic of a disease of the uveal tract. On the etiology of the affection, the opinion is given that punctate keratitis is a trophic disturbance of the posterior epithelium of the cornea, resulting either from an alteration or from a compression of the anterior ciliary nerves. Under glaucoma the author has a number of cases in which the beneficial effects of the instillation of cocaine and eserine were observed. The preparations used are eserine 1-200 and cocaine 1-30, four drops of each being instilled during the day.

In Chapter VI, diseases of the crystalline, Dr. Armaignac advises no hesitation in operating on diabetic patients. Congenital cataract occupies a large space of this section, the remaining pages of the chapter being devoted chiefly to notes on black cataract and to intra-ocular hemorrhage subsequent to cataract operations. With regard to the pathology of black cataract the author has devoted some researches to chemical and microscopical analysis of two crystalline lenses of this character that he removed. In microscopical examination the crystalline fibers were found more or less disorganized and covered with a quantity of small black grains. On the nature of the grains it is surmised that they may possibly be globules of hematosin. Still more delicate analyses must be used to determine this question, even a resort to spectral analysis.

From chapter VII, "on diseases of the retina and optic nerve," we learn that the author can add nothing to the meager therapeutics of detachment of the retina. It is also to be regretted that Dr. Armaignac contributes nothing to the pathology of the comparatively rare cases of congenital blindness with

atrophy of the optic nerve which he reports. To say that the atrophy is the result of intra-cranial pressure is exceedingly doubtful when we consider the free dilatability of the cranial cavity during intra-uterine existence. The experiments made by Deutschmann, with fluids charged with microbes injected into the cranial cavity, show it to be possible that these cases of congenital blindness may be in relation with microbic qualities of the fluid contained within the fetal cranium. There is also a question if the center of vision in the occipital lobe may not also have been attacked during intra-uterine life, with secondary degeneration of the optic nerve? The lack of opportunity for autopsy leaves these interesting questions still undecided. The remainder of this chapter is taken up by a note on optico-ciliary neurotomy and a discussion of the treatment of beginning atrophy of the optic nerve.

Chapter VIII deals with wounds of the eyeball and of the contiguous parts ; Chapter IX with the "Jequirity and Cocaine in Ocular Therapeutics ;" Chapter X with "Optometry and Ametropes, Blindness for Words, Amblyopia, Sudden Blindness, and Simulation ;" and Chapter XI considers, at the close of the work, hygiene of vision and ophthalmological instruments. All these sections contain numerous philosophical discussions on moot questions in ophthalmology, and deserve recommendation for special study on these points.

DISEASES OF THE EYE, A Handbook of Ophthalmic Practice, for Students and Practitioners. By G. E. DE SCHWEINITZ, M. D., Philadelphia : W. B. Saunders, 1892.

In the words of the author, "this book has been written in the hope that it may prove a service to students and practitioners, who desire to begin the study of ophthalmology." In this field it is a valuable addition to the current literature on the subject.

The work mainly consists of a series of concise and lucid statements covering the whole field of ophthalmology, and the evident intention in all cases is to reach the point with as few words as possible. While this plan of treatment renders the treatise elementary to a degree, it at the same time adapts it specially to the class of readers for whom it is intended. In many of the textbooks in use the statements of fact are so involved with the various theories, that the beginner can scarcely be expected to

read them understandingly ; in the work under consideration, this has been avoided, and with one or two exceptions (notably the description of the forms of granular conjunctivitis, in which the author is a little devious), the descriptions are definite, and should be plain to the most ordinary intelligence.

Considerable space is given to the examination of the eye, and here the beginner will find many things explained which are taken for granted in many text-books. That portion of the work written by Jas. Wallace, M. D., comprising physical optics, refraction, ophthalmoscopy, and the muscular anomalies, is well-written, and presents these subjects in a readable and interesting manner. We do not like the author's habit of using the term "ophthalmia" for all the external diseases. This word means nothing, and should become obsolete in this connection ; it is unscientific and inaccurate.

In most things the book is up to date, most of the newest methods, both of examination and treatment, are introduced, although we regret to see that the operation of slitting the canaliculus is still advised, an operation which, at the present time, should be rarely used.

The work is a good one in its sphere, and well worthy the perusal of the novice in ophthalmology.—D.

ITEMS.

—At the annual meeting of the faculty of the College of the New York Ophthalmic Hospital the following gentlemen were elected officers for the ensuing year : President, Clarence E. Beebe, M. D. ; dean, Charles Deady, M. D. ; secretary, Wm. E. Rounds, M. D.

—Dr. J. H. Buffum, of Chicago, has removed from 100 State Street to 34 Washington Street.

THE JOURNAL OF OPHTHALMOLOGY, OTOLOGY AND LARYNGOLOGY.

EDITOR,
CHARLES DEADY, M. D.

ASSOCIATE EDITORS,
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H. F. IVINS, M. D.

OBSERVATIONS WITH JAVAL'S OPHTHAL- MOMETER.

BY ELMER J. BISSELL, M. D., ROCHESTER, N. Y.

Not until Javal produced the model of 1889 did the ophthalmometer bearing his name come into general use. Until recently, therefore, little was written regarding its usefulness in refraction work. Sufficient time, however, has now elapsed since the introduction of this perfected instrument for careful observation, and our current literature is beginning to present the results.

These reports do not agree in all particulars, but, in the main, a general harmony prevails. All observers agree that it is a scientific and practical instrument, and that they could not well dispense with it.

Like all new instruments and methods which possess real merit, it suffers at the hands of the over enthusiastic. Some claim that by its use they no longer find it necessary to employ atropine, or homatropine, in determining the refraction; others would have you believe that they can largely dispense with former objective tests, and accurately prescribe astigmatic glasses from the data furnished by the ophthalmometer.

If ophthalmic science has demonstrated anything, it is that astigmatism is the cause of much suffering, and that to meet the needs of all cases, varied and repeated tests, coupled with good judgment, are necessary.

What is most needed now is to find out just what this instrument will do, and to clearly distinguish what it will do in *every* case from what it will do in possibly a majority of cases. Then its place in our armamentarium will have been determined, and we will know how much reliance to place upon our observations with it. With this end in view, I have tabulated from my case book five hundred (500) eyes out of about eight hundred which I have examined with the ophthalmometer, and have made four classifications.

I. Eyes in which the ophthalmometer, retinoscopy, and the subjective tests showed no astigmatism.

II. Eyes in which each of the three tests showed the *same* amount of astigmatism.

III. Eyes in which the ophthalmometer showed a *greater* amount of astigmatism than the other tests.

IV. Eyes in which the ophthalmometer showed *less* astigmatism than the other tests.

The table is arranged to show the age of the patient ; the astigmatism indicated by the ophthalmometer ; the amount found by retinoscopy ; the cylindrical glass prescribed ; the difference between the prescribed cylindrical and the amount determined by the ophthalmometer ; the axis to the meridian of the least corneal curvature ; the axis of the cylinder prescribed ; the general character of the refraction, and the cases in which a mydriatic was employed.

CLASS I.

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X.</i>
1	7325	54	R.	H.	..
2			L.	H.	..
3	7316	16	R.	H.	..
4			L.	H.	..
5	7314	58	R.	H.	..
6			L.	H.	..
7	7312	18	R.	E.	..
8			L.	E.	..
9	7310	6	R.	H.	..
10			L.	H.	..
* 11	7308	45	R.	H.	X
* 12			L.	H.	X
13	7305	33	R.	H.	..
14	7304	36	R.	E.	..
15			L.	H.	..
16	7299	43	R.	H.	X
17			L.	H.	X
18	7298	48	R.	H.	..
19			L.	H.	..
† 20	7292	4	R.	H.	X
21			L.	H.	X
22	7291	23	L.	H.	X
23	7289	58	R.	H.	..
24			L.	H.	..
25	7286	22	R.	E.	..
26			L.	E.	..
27	7281	20	R.	H.	..
28			L.	H.	..
29	7280	23	R.	H.	X
30			L.	H.	X
31	7270	35	L.	H.	..
32	7267	53	R.	H.	..
33			L.	H.	..
34	7266	50	R.	E.	..
35			L.	E.	..
36	7265	38	R.	H.	..
37	7263	9	L.	H.	X
38	7260	20	R.	H.	..
39			L.	H.	..
40	7253	21	R.	M.	X
41			L.	M.	X

* Optic neuritis.

† Converging strabismus.

CLASS I—*continued.*

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X.</i>
42	7250	47	R.	H.	..
43			L.	H.	..
44	7249	45	R.	H.	..
45			L.	H.	..
46	7245	31	L.	H.	X
47	7242	30	R.	E.	..
48			L.	E.	..
49	7238	28	R.	M.	..
50	7234		L.	M.	..
51	7234	70	R.	H.	..
52			L.	H.	..
53	7232	46	R.	H.	X
54			L.	H.	X
55	7229	47	R.	E.	..
56			L.	E.	..
57	7227	56	R.	E.	..
58			L.	E.	..
59	7223	18	R.	H.	X
60			L.	H.	X
61	7220	?	R.	M.	X
62	7214	40	L.	E.	..
63	7208	12	R.	E.	..
64			L.	E.	..
65	7205	15	R.	E.	..
66			L.	E.	..
67	7203	40	R.	E.	..
68			L.	E.	..
69	7201	23	R.	H.	..
70			L.	H.	..
* 71	7200	74	R.	H.	..
* 72			L.	H.	..
73	7198	65	R.	H.	..
74			L.	H.	..
75	7196	12	R.	H.	X
76			L.	H.	X
77	7193	15	R.	H.	X
78			L.	H.	X
79	7191	22	R.	E.	..
80			L.	E.	..
81	7187	21	L.	E.	..
82	7186	71	R.	H.	..

* Incipient cataract.

CLASS I—*continued.*

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X.</i>
83			L.	H.	..
84	7181	68	R.	H.	..
85			L.	H.	..
86	7180	35	R.	H.	X
87			L.	H.	X
88	7177	30	L.	H.	X
89	7176	18	R.	H.	X
90			L.	H.	X
91	7175	37	R.	M.	..
92	7172	33	R.	E.	..
93	7171	18	R.	H.	..
94	7167	61	R.	M.	X
95			L.	M.	X
96	7164	65	L.	H.	..
97	7166	48	R.	H.	..
98			L.	H.	..
99	7163	38	L.	H.	X
100	7160	9	R.	H.	X
101			L.	H.	X
102	7152	52	R.	H.	..
103	7143	59	R.	H.	..
104			L.	H.	..
105	7136	49	R.	H.	..
106			L.	H.	..
107	7134	32	R.	M.	..
108			L.	M.	..
109	7131	58	R.	H.	..
110			L.	H.	..
111	7128	13	L.	H.	..
112	7126	20	L.	H.	..
113	7123	5	R.	H.	..
114			L.	H.	..
115	7119	30	R.	M.	..
116			L.	M.	..
117	7118	29	R.	E.	..
118	7117	46	R.	H.	..
119			L.	H.	..
120	7329	25	R.	E.	..
121	7113	49	R.	H.	..
122			L.	H.	..
123	7105	34	R.	H.	..

CLASS I—*continued.*

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X.</i>
124			L.	H.	..
125	7094	38	R.	E.	..
126			L.	E.	..
127	7088	10	R.	H.	..
128			L.	H.	..
129	7085	55	R.	H.	..
130			L.	H.	..
131	7083	43	R.	H.	..
132			L.	H.	..
133	7081	16	R.	H.	X
134			L.	H.	X
135	7070	62	R.	H.	..
136			L.	H.	..
137	7065	63	R.	H.	..
138			L.	H.	..
139	7328	63	R.	H.	..
140			L.	H.	..
141	7054	19	L.	H.	X
142	7049	8	R.	H.	X
143			L.	H.	X
144	7335	52	R.	M.	..
145	7047	47	R.	E.	..
146			L.	E.	..
147	7045	58	R.	H.	..
148			L.	H.	..
149	7042	47	R.	H.	..
150			L.	H.	..
151	7037	33	R.	H.	..
152			L.	H.	..
153	7330	47	R.	H.	..
154			L.	H.	..
155	7335	22	R.	H.	X

CLASS II.

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>Astigmatism by Ophthalmometer.</i>	<i>Astigmatism by Retinoscopy.</i>	<i>Glass Prescribed.</i>	<i>Difference between Glass and Ophthalmometer.</i>	<i>Axis to Meridian of Least Curvature.</i>	<i>Axis of Glass Prescribed.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X.</i>
1	7323	16	L.	.25	+ .25	+ .25	=	90°	90°	E.	..
2	7322	45	R.	.25	+ .25	+ .25	=	90	90	H.	..
3			L.	.25	+ .25	+ .25	=	90	90	H.	..
4	7309	19	L.	2.00	+2.00	+2.00	=	105	105	H.	..
5	7306	17	R.	.75	— .75	— .75	=	90	180	M.	..
6			L.	.75	— .75	— .75	=	90	180	M.	..
7	7297	..	R.	.50	+ .50	+ .50	=	90	90	H.	X
8			L.	.50	+ .50	+ .50	=	90	90	H.	X
9	7291	23	R.	.25	+ .25	+ .25	=	90	90	H.	X
10	7290	18	R.	.25	+ .25	+ .25	=	90	90	H.	X
11	7279	17	R.	.25	+ .25	+ .25	=	90	105	H.	X
12			L.	.50	+ .50	+ .50	=	90	90	H.	X
13	7278	12	L.	.25	+ .25	+ .25	=	90	90	H.	X
14	7275	26	R.	.25	+ .25	+ .25	=	90	90	H.	X
15			L.	.50	+ .50	+ .50	=	90	90	H.	X
16	7274	32	R.	.50	+ .50	+ .50	=	90	90	H.	..
17			L.	.50	+ .50	+ .50	=	90	90	H.	..
18	7271	42	R.	.50	+ .50	+ .50	=	90	105	H.	X
19			L.	.25	+ .25	+ .25	=	90	75	H.	X
20	7270	35	R.	.25	+ .25	+ .25	=	75	75	H.	..
21	7268	23	R.	.25	+ .25	+ .25	=	90	75	H.	X
22			L.	.50	+ .50	+ .50	=	90	105	H.	X
23	7263	9	R.	.25	+ .25	+ .25	=	90	90	H.	X
24	7258	23	L.	.50	+ .50	+ .50	=	90	90	H.	X
25	7254	49	R.	.25	+ .25	+ .25	=	90	75	H.	..
26	7241	19	R.	.50	+ .50	+ .50	=	90	90	H.	X
27			L.	.25	+ .25	+ .50	=	90	90	H.	X
28	7237	22	R.	.25	+ .25	+ .25	=	90	90	H.	X
29			L.	.25	+ .25	+ .25	=	90	90	H.	X
30	7236	..	L.	.25	+ .25	+ .25	=	90	90	H.	X
31	7231	..	R.	.25	+ .25	+ .25	=	90	90	E.	..
32	7224	15	R.	.50	+ .50	+ .50	=	90	90	H.	X
33			L.	.50	+ .50	+ .50	=	90	105	H.	X
34	7218	52	R.	.50	+ .50	+ .50	=	180	180	H.	..
35	7217	37	R.	.50	+ .50	+ .50	=	90	90	H.	X
36	7216	22	R.	.25	+ .25	+ .25	=	90	90	H.	X
37			L.	.25	+ .25	+ .25	=	90	90	H.	X
38	7214	..	R.	.25	+ .25	+ .25	=	90	90	E.	..
39	7212	26	R.	.25	+ .25	+ .25	=	90	90	H.	X
40			L.	.25	+ .25	+ .25	=	90	90	H.	X
41	7210	43	L.	.50	+ .50	+ .50	=	90	90	H.	..
42	7204	24	R.	.25	+ .25	+ .25	=	90	90	H.	..
43	7199	14	R.	.50	+ .50	+ .50	=	90	90	H.	X
44	7194	35	R.	.25	+ .25	+ .25	=	90	90	H.	X
45			L.	1.00	+1.00	+1.00	=	90	90	H.	X
46	7190	16	L.	.75	— .75	— .75	=	180	75	M.	X

CLASS II—*continued.*

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>Astigmatism by Ophthalmometer.</i>	<i>Astigmatism by Retinoscopy.</i>	<i>Glass Prescribed.</i>	<i>Difference between Glass and Ophthalmometer.</i>	<i>Axis to Meridian of Least Curvature.</i>	<i>Axis of Glass Prescribed.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X.</i>
47	7188	..	L.	.25	+ .25	+ .25	=	90°	90°	H.	X
48	7171	18	L.	.50	+ .50	+ .50	=	90	90	H.	..
49	7184	24	R.	.25	+ .25	+ .25	=	90	90	H.	X
50			L.	.75	+ .75	+ .75	=	90	90	H.	X
51	7173	17	R.	.50	+ .50	+ .50	=	90	90	H.	X
52			L.	.25	+ .25	+ .25	=	90	90	H.	X
53	7159	..	R.	.75	+ .75	+ .75	=	90	90	H.	X
54			L.	.25	+ .25	+ .25	=	90	105	H.	X
¹ 55	7157	44	R.	.25	..	+ .25	=	120	30	E.	..
¹ 56			L.	.25	..	+ .25	=	50	145	E.	..
57		38	R.	.25	..	+ .25	=	90	80	H.	X
58			L.	.25	+ .25	+ .25	=	90	90	H.	X
59	7152	52	L.	.25	+ .25	+ .25	=	90	90	H.	..
60	7148	..	R.	.75	+ .75	+ .75	=	90	90	H.	X
61			L.	.50	+ .50	+ .50	=	90	90	H.	X
62	7145	9	R.	1.00	+ 1.00	+ 1.00	=	90	90	H.	X
63			L.	.50	+ .50	+ .50	=	90	85	H.	X
64	7142	37	R.	.50	+ .50	+ .50	=	90	90	H.	X
65			L.	.25	+ .25	+ .25	=	90	85	H.	X
66	7138	30	R.	.25	+ .25	+ .25	=	90	90	E.	..
67			L.	.25	+ .25	+ .25	=	90	90	E.	..
68	7132	27	R.	.25	— .25	— .25	=	75	145	M.	X
69	7130	30	R.	.25	+ .25	+ .25	=	90	75	H.	X
70	7115	19	L.	.25	+ .25	+ .25	=	90	90	H.	X
71	7112	32	L.	.25	+ .25	+ .25	=	90	90	H.	X
72	7111	40	R.	.75	+ .75	+ .75	=	90	90	H.	..
73			L.	.50	+ .50	+ .50	=	90	90	H.	..
74	7099	38	L.	.25	+ .25	+ .25	=	90	100	H.	X
75	1097	28	R.	.25	+ .25	+ .25	=	90	90	H.	X
76			L.	.50	+ .50	+ .50	=	90	90	H.	X
77	1093	41	R.	.50	+ .50	+ .50	=	90	90	H.	X
78			L.	.25	..	+ .25	=	90	90	H.	X
79	1091	30	R.	.50	+ .50	+ .50	=	90	90	H.	X
80			L.	.50	+ .50	+ .50	=	90	90	H.	X
81	7086	9	L.	.25	+ .25	+ .25	=	90	90	H.	X
82	7077	18	L.	.50	— .50	— .50	=	90	180	M.	..
83	7068	33	R.	.50	+ .50	+ .50	=	90	70	H.	X
84			L.	.75	+ .75	+ .75	=	90	90	H.	X
85	7057	10	R.	.25	+ .25	+ .25	=	90	90	H.	X
86			L.	.50	+ .50	+ .50	=	90	90	H.	X
87	7052	43	R.	1.25	+ 1.25	+ 1.25	=	15	10	H.	X
88	7048	..	L.	1.00	+ 1.00	+ 1.00	=	90	85	H.	X
89	7040	..	R.	.50	+ .50	+ .50	=	90	85	H.	X
90			L.	.50	+ .50	+ .50	=	90	95	H.	X
91	7039	21	R.	.50	— .50	— .50	=	90	180	M.	X
92			L.	.50	— .50	— .50	=	105	15	M.	X

¹ Axis against rule.

CLASS II—continued.

No. of Eye.	Case Book No.	Age.	Right or Left Eye.	Astigmatism by Ophthalmometer.	Astigmatism by Retinoscopy.	Glass Prescribed.	Difference between Glass and Ophthalmometer.	Axis to Meridian of Least Curvature.	Axis of Glass Prescribed.	General Refraction of Eye.	Mydr. Employed Marked X.
¹ 93	6087	27	L.	4.00	+4.00	+4.00	=	10°	10°	H.	..
² 94	5066	42	L.	3.00	+3.00	+3.00	=	75	60	H.	..
³ 95	5066	42	L.	1.25	+1.25	+1.25	=	75	75	H.	..
¹ 96	5008	61	R.	2.25	+2.25	+2.25	=	180	180	..	..
97	7334	23	R.	.75	+ .75	+ .75	=	90	90	M.	..
⁴ 98	7351	17	L.	.25	+ .25	+ .25	=	90	180	H.	×
99	7340	26	R.	.25	+ .25	+ .25	=	90	90	H.	×
100			L.	.25	+ .25	+ .25	=	90	90	H.	×
101	7076	35	L.	2.00	+1.50	+1.50	} =	90	90	..	×
					— .50	— .50					
102	7075	26	R.	4.50	+4.00	+4.00	} =	70	70	..	×
					— .50	— .50					
103	6225	26	R.	1.00	+1.00	+1.00	=	90	80	H.	×
⁴ 104	6326	22	R.	.25	— .25	— .25	=	90	90	M.	×
105			L.	.25	+ .25	+ .25	=	90	110	H.	×
106	6478	18	R.	.25	+ .25	+ .25	=	80	90	E.	×
107			L.	.50	+ .50	+ .50	=	90	90	E.	×
⁵ 108	6449	78	L.	1.50	+1.50	+1.50	=	180	180	..	..
109	652	18	R.	.25	+ .25	+ .25	=	90	90	H.	×
110			L.	.25	+ .25	+ .25	=	90	90	H.	×

CLASS III.

1	7321	42	R.	.50	..	..	.50	90	..	H.	..
2	7300	25	R.	.25	..	..	.25	90	..	H.	×
3			L.	.25	..	..	.25	90	..	H.	×
4	7288	25	R.	.25	..	..	.25	90	..	M.	..
5			L.	.25	..	..	.25	90	..	M.	..
6	7287	20	R.	.25	..	..	.25	90	..	E.	..
7			L.	.25	..	..	.25	90	..	E.	..
8	7255	67	R.	.25	..	..	.25	90	..	H.	..
9			L.	.50	..	..	.50	90	..	H.	..
10	7245	31	R.	.25	..	..	.25	90	..	H.	×
11	7244	..	R.	.25	..	..	.25	90	..	M.	..
12			L.	.50	..	..	.50	90	..	M.	..
13	7222	22	R.	.75	..	..	.75	90	..	H.	×
14	7218	52	L.	.25	..	..	.25	180	..	H.	..
15	7210	43	R.	.25	..	..	.25	90	..	H.	..
16	7195	66	R.	.25	..	..	.25	90	..	H.	..
17			L.	.25	..	..	.25	90	..	H.	..
18	7188	..	R.	.75	..	..	.75	90	..	H.	×
19	7179	65	R.	.75	..	..	.75	90	..	H.	..
20			L.	.75	..	..	.75	90	..	H.	..
21	7165	58	R.	.50	..	..	.50	90	..	H.	..
22			L.	.50	..	..	.50	90	..	H.	..
23	7163	38	R.	.25	..	..	.25	90	..	H.	×
24	7154	..	R.	.25	..	..	.25	90	..	H.	×

¹ After cataract.² With chalazion.³ After removal.⁴ Axis against rule.⁵ After cataract extraction.

CLASS III—continued.

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>Astigmatism by Ophthalmometer.</i>	<i>Astigmatism by Retinoscopy.</i>	<i>Glass Prescribed.</i>	<i>Difference between Glass and Ophthalmometer.</i>	<i>Axis to Meridian of Least Curvature.</i>	<i>Axis of Glass Prescribed.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X</i>
25	7154	..	L.	.75	..	..	.75	90°	..	H.	X
26	7128	13	R.	.50	..	..	.50	90	..	H.	X
27	7125	60	R.	.25	..	..	.25	90	..	H.	..
28			L.	.25	..	..	.25	90	..	H.	..
29	7121	..	R.	.25	..	..	.25	90	..	H.	X
30	7120	7	R.	.25	..	..	.25	90	..	H.	X
31	7118	29	L.	.25	..	..	.25	180	..	E.	..
32	7115	19	R.	.25	..	..	.25	90	..	H.	X
33	7090	14	R.	.75	..	..	.75	90	..	H.	X
34			L.	.75	..	..	.75	100	..	H.	X
35	7089	40	R.	.25	..	..	.25	90	..	H.	X
36			L.	.25	..	..	.25	90	..	H.	X
37	7086	9	R.	.25	..	..	.25	90	..	H.	X
38	7079	40	R.	.75	..	..	.75	90	..	H.	..
39	7079		L.	.25	..	..	.25	90	..	H.	..
40	7069	12	R.	1.00	..	..	1.00	90	..	M.	X
41			L.	1.00	..	..	1.00	90	..	M.	X
42	7058	12	R.	.25	..	..	.25	90	..	H.	X
43			L.	.25	..	..	.25	90	..	H.	X
44	7054	19	R.	.25	..	..	.25	90	..	H.	X
45	7044	30	R.	.50	..	..	.50	90	..	H.	..
46			L.	.25	..	..	.25	90	..	H.	..
47	7335	52	L.	.75	..	..	.75	90	..	M.	..
48	7324	49	R.	.50	+ .25	+ .25	.25	90	90°	H.	..
49	7324	49	L.	.75	+ .50	+ .50	.25	90	90	H.	..
50	7323	16	R.	.50	+ .25	+ .25	.25	90	90	E.	..
51	7321	42	L.	1.50	+ .50	+ .50	1.00	90	90	H.	..
¹ 52	7320	68	R.	.50	+ .25	..	.50	180	..	H.	..
¹ 53			L.	.50	+ .25	..	.50	180	..	H.	..
54	7319	35	R.	.75	— .25	..	.75	90	..	M.	..
55			L.	.75	— .50	— .50	.25	90	180	M.	..
¹ 56	7315	67	R.	.25	+ .25	..	.25	180	..	H.	..
¹ 57			L.	.25	+ .25	..	.25	180	..	H.	..
58	7313	21	R.	1.25	+ .50	+ .50	.75	90	90	H.	..
59			L.	1.25	+ .50	+ .50	.75	90	90	H.	..
60	7311	24	R.	1.50	+ 1.00	+ .75	.75	75	80	E.	..
61			L.	1.00	+ 1.00	+ .75	.25	90	90	E.	..
62	7309	19	R.	1.00	+ .50	+ .50	.50	75	65	H.	..
63	7307	55	R.	1.50	+ .50	..	1.50	90	..	H.	..
64			L.	2.00	+ .50	..	2.00	90	..	H.	..
65	7305	33	L.	.50	+ .50	+ .25	.25	90	90	E.	..
² 66	7303	20	R.	1.50	..	..	1.50	120	..	H.	..
² 67			L.	1.50	..	..	1.50	105	..	H.	..
68	7302	23	R.	.75	+ .75	+ .50	.25	90	90	H.	X
69			L.	1.00	+ 1.00	+ .75	.25	90	90	H.	X
70	7294	..	R.	.50	+ .25	+ .25	.25	90	90	H.	..

¹ Retinoscopy indicated axis against the rule.² Choroiditis and interstitial keratitis.

CLASS III—continued.

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>Astigmatism by Ophthalmometer.</i>	<i>Astigmatism by Retinoscopy.</i>	<i>Glass Prescribed.</i>	<i>Difference between Glass and Ophthalmometer.</i>	<i>Axis to Meridian of Least Curvature.</i>	<i>Axis of Glass Prescribed.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X.</i>
71			L.	.50	+ .25	+ .25	.25	90°	105°	H.	..
72	7293	23	L.	.75	+ .75	+ .25	.50	90	90	H.	X
73	7290	18	L.	.75	+ .50	+ .50	.25	90	90	H.	X
74	7285	17	L.	4.50	+4.25	+4.00	.50	75	70	H.	X
75	7284	36	R.	1.00	+ .50	+ .50	.50	90	90	H.	X
76			L.	1.25	+ .75	+ .75	.50	90	90	H.	X
77	7283	11	R.	1.25	+1.00	+ .75	.50	90	90	H.	X
78			L.	1.25	+ .75	+ .75	.50	90	90	H.	X
79	7277	26	R.	.50	— .25	..	.50	90	..	M.	..
80			L.	.50	— .25	..	.50	110	..	M.	..
81	7272	30	R.	.75	+ .25	+ .25	.50	90	90	H.	..
82			L.	.50	+ .25	+ .25	.25	90	105	H.	..
83	7269	29	R.	.75	..	+ .25	.50	90	90	H.	..
84			L.	.75	+ .25	+ .50	.25	90	90	H.	..
85	7265	38	L.	5.00	+4.00	+4.00	1.00	90	90	H.	..
86	7261	39	R.	.75	+ .50	+ .50	.25	90	90	E.	..
87			L.	.75	+ .75	+ .50	.25	90	90	E.	..
88	7254	49	L.	.75	+ .25	+ .25	.50	105	105	H.	..
189	7252	44	R.	.25	+ .25	..	.25	180	..	H.	..
90			L.	.25	+ .25	..	.25	180	..	H.	..
91	7248	12	R.	1.50	+ .25	..	1.50	90	..	H.	..
92			L.	1.50	+ .25	..	1.50	90	..	H.	..
293	7247	14	R.	1.25	+ .75	+ .75	.50	105	105	H.	X
294			L.	1.00	+ .75	+ .50	.50	90	90	H.	X
95	7243	49	R.	1.25	..	+ .75	.50	180	170	H.	..
96			L.	2.25	..	+1.25	1.00	180	5	H.	..
97	7240	..	R.	.25	+ .25	..	.25	90	..	H.	X
98			L.	.25	+ .25	..	.25	90	..	H.	X
399	7239	69	R.	5.00	+5.00	+4.00	1.00	180	180	H.	..
100	7233	51	R.	1.00	+ .75	+ .75	.25	90	90	H.	..
101			L.	1.00	+ .75	.50	.50	90	90	H.	..
102	7226	24	L.	1.50	+1.00	+ .75	.75	90	90	H.	X
103	7225	30	R.	.75	+ .25	+ .25	.50	90	90	H.	X
104			L.	1.00	+ .50	+ .50	.50	90	90	H.	X
105	7222	22	L.	1.00	+ .25	+ .25	.75	90	90	H.	X
106	7220	..	L.	.50	+ .25	..	.50	90	..	M.	X
107	7217	37	L.	1.00	+ .75	+ .75	.25	90	90	H.	X
108	7215	17	R.	1.25	+1.25	+1.00	.25	90	90	H.	X
109			L.	1.25	+1.25	..1.00	.25	90	90	H.	X
4110	7213	32	R.	2.00	+2.00	..	2.00	90	..	H.	X
111			L.	1.25	+1.00	+1.00	.25	90	90	H.	X
112	7211	28	R.	1.00	+ .75	+ .75	.25	80	80	H.	X
113			L.	1.50	+1.25	+1.00	.50	95	95	H.	X
114	7207	36	R.	3.00	+3.00	+2.75	.25	75	85	H.	..
115			L.	2.75	+2.50	+2.50	.25	105	95	H.	..
116	7204	24	L.	.50	+ .25	+ .25	.25	90	90	H.	..

¹ Retinoscopy indicates axis against the rule.² Converging strabismus with spasm of the ciliary muscle.³ After cataract extraction.⁴ Converging strabismus.

CLASS III—continued.

No. of Eye.	Case Book No.	Age.	Right or Left Eye.	Astigmatism by Ophthalmometer.	Astigmatism by Retinoscopy.	Glass Prescribed.	Difference between Glass and Ophthalmometer.	Axis to Meridian of Least Curvature.	Axis of Glass Prescribed.	General Refraction of Eye.	Mydr. Employed Marked X.
117	7202	14	L.	4.25	+4.50	+4.00	.25	100°	100°	H.	×
118	7199	14	L.	.75	+ .25	+ .25	.50	90	90	H.	×
119	7197	18	R.	1.50	+ .25	+ .25	1.25	90	90	H.	×
120			L.	1.50	+ .50	+ .50	1.00	90	90	H.	×
121	7192	..	R.	1.00	— .50	— .50	.50	120	60	M.	×
122	7190	16	R.	1.50	— 1.50	— 1.25	.25	20	115	M.	×
123	7185	..	R.	.50	+ .25	+ .25	.25	90	90	H.	×
124			L.	.50	+ .25	+ .25	.25	90	90	H.	×
125	7183	23	R.	1.00	— .75	— .75	.25	180	120	M.	..
126	7182	15	R.	1.00	+ .50	+ .50	.50	90	90	H.	×
127			L.	1.00	+ .50	+ .50	.50	90	90	H.	×
128	7177	30	R.	1.00	+ .25	..	1.00	90	..	H.	×
129	7175	37	L.	.25	— .25	..	.25	90	..	M.	..
130	7170	..	R.	.50	+ .50	..	.50	90	..	H.	..
131			L.	.25	+ .25	..	.25	90	..	H.	..
132	7169	9	R.	.75	+ .50	+ .50	.25	90	90	H.	×
133			L.	1.25	+ .50	+ .50	.75	90	90	H.	×
134	7164	65	R.	1.00	+ .50	..	1.00	90	..	H.	..
135	7153	50	R.	.75	+ .50	+ .50	.25	90	90	H.	×
136			L.	1.00	+ 1.00	+ .75	.25	90	90	H.	×
137	7140	..	R.	6.00	— 5.00	— 4.00	2.00	90	5	M.	×
138			L.	8.00	— 7.00	— 4.00	4.00	75	165	M.	×
139	7133	22	R.	.50	+ .25	..	.50	90	..	H.	×
140			L.	.50	+ .25	..	.50	90	..	H.	×
141	7132	27	L.	.75	— .50	— .50	.25	105	5	M.	×
142	7121	..	L.	.50	+ .25	+ .25	.25	90	90	H.	×
143	7120	7	L.	.50	+ .25	+ .25	.25	90	90	H.	×
¹ 144	7116	14	R.	.75	+ .50	+ .50	.25	150	105	H.	×
¹ 145	7116	14	L.	.75	+ .50	+ .50	.25	105	75	H.	×
146	7112	32	R.	5.00	— 5.00	— 2.50	2.50	135	45	M.	×
147	7110	44	R.	1.00	+ .75	+ .75	.25	105	90	H.	..
148			L.	4.00	+ 4.00	+ 3.00	1.00	75	75	H.	..
149	7100	52	R.	.75	+ .75	+ .50	.75	90	90	H.	..
150			L.	.50	+ .25	+ .25	.25	90	120	H.	..
151	7099	38	R.	1.00	+ .75	+ .75	.25	90	90	H.	×
152	7098	26	R.	.75	+ .50	+ .50	.25	90	90	H.	×
153			L.	1.00	+ .75	+ .75	.25	90	90	H.	×
154	7092	21	L.	3.00	+ 2.50	+ 2.00	1.00	135	135	H.	×
² 155	7082	72	L.	5.50	..	+ 4.50	1.00	160	150	H.	..
156	7078	10	R.	1.25	+ 1.00	+ 1.00	.25	90	90	H.	×
157			L.	1.00	+ .50	+ .50	.50	90	90	H.	×
158	7077	18	R.	.75	— .75	— .50	.25	90	180	M.	..
159	7072	24	R.	1.50	+ 1.00	+ 1.00	.50	90	90	H.	×
160			L.	1.50	+ 1.50	+ 1.25	.25	90	80	H.	×
161	7060	36	R.	.50	+ .25	+ .25	.25	90	90	E.	×
³ 162			L.	.50	+ .25	+ .25	.25	90	90	E.	×

¹ Axis against rule.² After cataract extraction.³ Conical cornea.

CLASS III—continued.

No. of Eye.	Case Book No.	Age.	Right or Left Eye.	Astigmatism by Ophthalmometer.	Astigmatism by Retinoscopy.	Glass Prescribed.	Difference between Glass and Ophthalmometer.	Axis to Meridian of Least Curvature.	Axis of Glass Prescribed.	General Refraction of Eye.	Mydr. Employed Marked X.
¹ 163	7327	25	R.	7.00	..	—4.00	3.00	90°	180°	M.	×
164			L.	3.00	..	—2.75	.25	75	160	M.	×
165	7050	33	R.	1.00	+ .50	+ .50	.50	90	90	H.	×
166			L.	1.25	+ .50	+ .50	.75	90	80	H.	×
167	7048	..	R.	1.75	+1.00	+1.00	.75	90	90	M.	×
² 168	7043	23	R.	.50	+ .25	+ .25	.25	90	180	H.	×
169	7043	23	L.	.75	+ .25	+ .25	.50	90	90	H.	×
170	7041	42	R.	3.00	+3.00	+2.50	.50	90	90	H.	..
171			L.	3.25	+3.50	+2.50	.75	90	80	H.	..
172	5066	42	R.	.50	+ .25	+ .25	.25	90	90	H.	×
³ 173	5065	61	L.	6.00	+6.00	+5.00	1.00	165	155	H.	..
³ 174	5059	78	R.	5.00	+5.00	+4.50	.50	10	10	H.	..
⁴ 175	5059	78	R.	1.50	+1.50	+1.50	..	10	10	..	..
176	7334	23	L.	.75	+ .50	+ .50	.25	90	90	H.	..
177	7332	18	L.	.50	+ .50	+ .25	.25	90	90	H.	×
² 178	7331	17	R.	.50	+ .25	+ .25	.25	90	180	H.	×
179	7285	17	R.	3.50	+4.00	+3.00	.50	105	105	..	×
					— .50	..					
180	7258	23	R.	1.25	+ .50	..	.75	90	90	..	×
					— .25	+ .50					
⁵ 181	7231	..	L.	2.50	+ .75	+ .75	.75	90	90	..	×
					—1.00	—1.00					
182	7226	24	R.	2.00	+1.00	+ .50	1.00	90	105	..	×
					— .50	— .50					
183	7155	18	R.	3.00	+ .50	+ .50	1.00	90	90	..	×
					—2.00	—1.50					
184	7076	35	R.	2.00	+1.00	+ .75	.25	90	90	..	×
					— .75	—1.00					
185	7051	..	R.	1.75	+ .50	+ .50	.25	90	70	..	×
					—1.00	—1.00					
186	7332	18	R.	2.75	+2.50	+1.75	.25	90	90	..	×
					— .75	— .75					
⁶ 187	7318	20	R.	3.25	+3.00	..	.25	120	115	..	×
					— .50	+3.00					
⁶ 188			L.	2.75	+2.00	+1.00	.75	85	75	..	×
					—1.00	—1.00					
189	7301	35	L.	2.00	+ .50	..	1.25	95	15	..	×
					— .75	— .75					
190	7337	29	R.	.50	+ .25	+ .25	.25	80	80	H.	..
191			L.	.50	+ .25	+ .25	.25	80	80	H.	..
192	6225	26	L.	1.50	+1.00	+1.25	.25	90	90	H.	×

¹ Conical cornea.⁴ Four months later.² Axis against rule.⁵ Marked ptosis.³ After cataract extraction.⁶ Slight leucoma.

CLASS IV.

<i>No. of Eye.</i>	<i>Case Book No.</i>	<i>Age.</i>	<i>Right or Left Eye.</i>	<i>Astigmatism by Ophthalmometer.</i>	<i>Astigmatism by Retinoscopy.</i>	<i>Glass Prescribed.</i>	<i>Difference between Glass and Ophthalmometer.</i>	<i>Axis to Meridian of Least Curvature.</i>	<i>Axis of Glass Prescribed.</i>	<i>General Refraction of Eye.</i>	<i>Mydr. Employed Marked X.</i>
1	7278	12	R.	..	+ .25	+ .25	.25	..	90°	H.	X
2	7264	20	R.	..	+ .50	+ .50	.50	..	180	H.	X
3			L.	..	+ .25	+ .25	.25	..	160	H.	X
4	7236	..	R.	..	+ .25	+ .25	.25	..	105	H.	X
5	7183	23	L.	..	- .25	- .25	.25	..	180	M.	..
6	7168	19	R.	..	+ .25	+ .25	.25	..	95	H.	X
7			L.	..	+ .25	+ .25	.25	..	85	H.	X
8	7162	21	R.	..	+ .50	+ .75	.75	..	90	H.	X
9			L.	..	+ .25	+ .50	.50	..	90	H.	X
10	7149	37	R.	..	..	- .50	.50	..	115	M.	..
11			L.	..	..	- .50	.50	..	60	M.	..
12	7146	27	R.	..	+ .75	+ .75	.75	..	90	H.	X
13			L.	..	+ .50	+ .50	.50	..	90	H.	X
14	7130	30	L.	..	+ .50	+ .25	.25	..	90	H.	X
15	7127	..	R.	..	+ .50	+ .25	.25	..	90	H.	..
16	7122	23	R.	..	- .75	- .75	.75	..	90	M.	..
17			L.	..	- .50	- .50	.50	..	90	M.	..
18	7114	23	R.	..	+ .50	+ .50	.50	..	165	H.	X
19			L.	..	+ .50	+ .50	.50	..	15	H.	X
20	7092	21	R.	..	+ .50	+ .50	.50	..	30	H.	X
21	7202	14	R.	3.25	+ 4.25	+ 4.00	.75	80°	80	H.	X
22	7150	24	R.	.50	+ 1.25	+ 1.00	.50	90	90	H.	..
23			L.	.25	+ 1.25	+ 1.00	.75	90	90	H.	..
24	7147	26	R.	.25	+ .75	+ .50	.25	90	90	H.	X
25	7147	26	L.	.25	+ .75	+ .50	.25	90	90	H.	X
26	7137	28	R.	.25	- 1.00	- 1.00	.75	90	180	M.	X
27			L.	.25	- 2.00	- 1.50	1.25	90	180	M.	X
28	7127	..	L.	.25	+ .75	+ .50	.50	90	90	H.	X
29	7126	..	R.	.25	+ .50	+ .50	.25	90	90	H.	X
30	7124	..	R.	.25	+ .75	+ .50	.55	90	90	H.	X
31			L.	.25	+ .50	+ .50	.25	90	90	H.	X
32	7106	..	R.	.25	+ .50	+ .50	.25	90	105	H.	X
33			L.	.25	+ .50	+ .50	.25	90	75	H.	X
34	7104	28	R.	.25	+ .50	+ .50	.25	90	80	H.	X
35			L.	.25	+ .50	+ .50	.25	105	100	H.	X
36	7102	31	R.	.25	+ .50	+ .50	.25	90	90	H.	X
37			L.	.25	+ .50	+ .50	.25	90	90	H.	X
38	7052	43	L.	1.25	+ 2.00	+ 2.00	.75	180	180	H.	X
39	7336	27	L.	1.00	+ .50	+ 1.25	.25	180	180	H.	X
40	7209	49	R.	1.75	+ .50	+ .50	.25	90	90	..	X
41			L.	1.75	+ .50	+ .50	.25	90	90	..	X
42	7051	..	L.	1.75	+ 1.00	+ 1.00	.25	90	90	..	X
43	7336	27	R.	2.00	+ 2.50	+ 2.50	1.00	180	180	..	X

In Class I there are 155 eyes. This indicates that in thirty-one per cent. of the eyes examined no astigmatism was found by any test. The one interesting fact regarding Class I is the large number of patients (over one-half) past thirty-five years of age. This is in accord with universal experience that in the majority of patients who consult us for presbyopia, we find very little, if any, astigmatism. Homatropine was employed in one-fourth of the cases.

In Class II there are 110 eyes, or twenty-two per cent. of the whole number examined, in which the ophthalmometer gave the same amount of astigmatism as the other tests. Homatropine was used in about four-fifths of this class.

Eyes 93, 96, and 108 were measured after cataract extraction. The ophthalmometer perfectly revealed the degree of astigmatism and the axis of the cylinder prescribed.

No. 44 is one of the most interesting cases recorded. The patient had a large chalazion in the center of the left upper lid, and she complained of marked eye strain. V. O. S. = $\frac{20}{70}$; ophthalmometer = +3.00 D. 75° and 165° ; retinoscopy = +3.00 D^c., axis 75° . I prescribed +3.00 D^c. axis 60° . This brought the vision up to $\frac{20}{20}$, and corrected the lines on the astigmatic dial. Three weeks after making this prescription, she concluded that she would have the chalazion removed. A few days after its removal she returned, saying that she could not see with her glasses, which formerly had given so good vision. Again I tested the eye; ophthalmometer = ± 1.25 D. 75° , and 165° ; retinoscopy = +1.25 D^c. axis 75° . I changed the glasses to +1.25 D^c., axis 75° , and V. = $\frac{20}{20}$. These she has worn for a year. I believe that the pressure exerted by the chalazion upon the globe increased the corneal curvature in the perpendicular meridian. This case shows at least one advantage of the instrument: It clearly revealed where the change in the refraction occurred—at the cornea.

Adding together Classes I and II there is a total of 265 eyes, or fifty-three per cent., in which the ophthalmometer perfectly corresponded with other tests. While this is a

good showing for the instrument, it is not a sufficiently large per cent. to warrant one in prescribing glasses from it.

In Class III there are 192 eyes, or thirty-eight per cent. of all under observation, in which the ophthalmometer gave a greater amount of astigmatism than the other tests. A mydriatic was used in 106 eyes (a little more than one-half). In 99 eyes, or fifty per cent., the difference between the cylinder prescribed and the astigmatism noted by the ophthalmometer was .25 D.; in 43, .50 D.; in 23, .75 D.; in 15, 1.00 D.; in 2, 1.25 D.; in 5, 1.50 D.; in 2, 2.00 D.; in 1, 2.50 D. (No. 146, myopia 13 D.); in 1, 3.00 D. (No. 163, with conical cornea); and in 1, 4.00 D. (No. 38, myopia 12 D.).

In 47 eyes of this class, the ophthalmometer showed astigmatism; the other tests, none. In 29 of the 47, it indicated only .25 D.; in 7, .50 D.; in 9, .75 D.; and in 2, 1.00 D.

Mixed astigmatism was found in 11 eyes. Four eyes were examined after cataract extraction; 3 of which took a cylinder 1.00 D. less than the ophthalmometer indicated; and 1, .50 D. less.

In Class IV. there are 43 eyes, or a little less than nine per cent., in which the ophthalmometer indicated less astigmatism than the other tests. A mydriatic was employed in 35 eyes. In 22 eyes the difference between the cylinder prescribed and the astigmatism noted by the ophthalmometer was .25 D.; in 11, .50 D.; in 7, .75 D.; in 1, 1.00 D.; and in 1, 1.25 D. In 20 eyes out of the 43 the ophthalmometer indicated no astigmatism, but other tests did; and a cylinder was prescribed. Of the cylinders for the 20 eyes 8 were .25 D.; 9, .50 D.; and 3, .75 D. Mixed astigmatism occurred in 4 eyes, in 3 of which the ophthalmometer showed .25 D. less; and in the other, 1.00 D. less than the other tests.

In 265 eyes out of the 500 examined, the ophthalmometer corresponded with other tests; in 121 it showed a difference of .25 D. from the cylinder prescribed; in 54, a differ-

ence of .50 D.; in 30, a difference of .75 D.; in 16, a difference of 1.00 D.; and in 14, a difference ranging from 1.25 D. to 4.00 D. A mydriatic was used in 259 eyes, or about one-half the number examined.

The axis of the cylinder prescribed agreed with the ophthalmometer in 94 eyes; differed from 5 to 20 degrees in 54 eyes, and was against the rule in 13 eyes. The instrument is capable of more accurately indicating the axis than these figures indicate, but unnecessary time would be spent in adjusting the instrument in cases of slight astigmatism. The greater the astigmatism, the more rapidly and perfectly can the axis be secured. In less than three per cent. the axis of the cylinder was against the rule, as shown by the ophthalmometer.

Dr. Black, in the July *Archives of Ophthalmology*, p. 333, states that he finds fourteen per cent. against the rule.

Conclusion.—My experience with the ophthalmometer has led me to the following conclusions:

I. It correctly indicates in all cases the presence or absence of corneal astigmatism, the amount when present, and the meridians of greatest and least curvature.

II. It demonstrates that astigmatism is usually corneal, and that in a majority of eyes the cornea reveals the *total* astigmatism. It also as positively shows that the refraction may be astigmatic in an eye with a normally curved cornea, and that in all probability in such eyes the shape or position of the crystalline lens is the cause of it.

From the large number of eyes in which the subjective test indicated more or less astigmatism than the ophthalmometer, it would appear as though lenticular astigmatism was quite common. This I do not believe to be the case. It must be remembered that there were 121 eyes in which the difference was only .25 D., and fifty-four in which it was .50 D. Now it is a well appreciated fact that any two observers examining the same eye with the same tests are liable to find their respective results varying from .25 D. to .50 D., so that these slight differences are as liable to be the

fault of the observer as of the instrument or method employed. But there are other reasons for believing that lenticular astigmatism is rare. Dr. Burnett* has shown that the cornea gradually diminishes in curvature from the visual axis toward the periphery, and more often this diminution is greater in the horizontal meridian than in the vertical. On the average it amounts to 2.00 D. at 15° on the nasal side, and .50 D. on the temporal side. The ophthalmometer, however, measures the whole cornea and not simply that central portion used in ordinary vision where the difference between the perpendicular and horizontal meridians is least. The optical result of this would be that a patient would take a cylinder less than the ophthalmometer indicated.

Experience has shown this to be the fact in a large per cent. of eyes examined. The same possibility of difference enters into eyes refracted with a dilated pupil. That the difference between the ophthalmometrical measurement and the glass prescribed is not caused by astigmatism in the lens, is further proved by the fact that after cataract extraction many patients cannot take the cylinder indicated by the ophthalmometer. See Class III., Nos. 99, 155, 174, and 175.

III. It shows that the tension of the lids influences the corneal curvature; that atropine and homatropine do not materially affect its curvature, and that tenotomy of the ocular muscles very rarely, if at all, changes the curvature of the cornea.

IV. It demonstrates that hyperopia and myopia are not usually due to changes at the cornea.

V. It is of great service in determining the *axis* of a cylinder for patients with amblyopia who cannot decide within five to twenty degrees the best position for it.

VI. It lessens the number of cases in which a mydriatic should be employed.

VII. It demonstrates to my satisfaction the utter uselessness of trying to reduce to a general rule the prescribing of astigmatic glasses.

* *American Journal of Ophthalmology*, vol. ix. p. 238.

To deduct from the ophthalmometrical measurement .25 D. or .50 D., as has been suggested, is radically wrong. It does an injustice to about fifty per cent. of the patients examined. Dr. Story* of Dublin found that in 62 eyes out of 139 the ophthalmometer indicated the same amount of astigmatism as the other tests.

In prescribing astigmatic glasses each case must be individualized. The ophthalmometer is a scientific instrument revealing certain facts regarding the cornea that no other instrument furnishes, but its chief sphere of usefulness is to quickly indicate the line of investigation which must be followed in refraction work. To this extent the instrument is invaluable.

* *Ophthalmic Review*, vol x. p. 195.

NOTES ON SYPHILITIC INTERNAL OTITIS.*

BY DR. J. CHARAZAC, TOULOUSE, FRANCE.

All the parts of the ear may be affected by syphilis in its different periods, although the most frequent lesions are observed during the secondary stage, and are the result of the occurrence of syphilides at the orifice of the tubes, with propagation to the tube or to the tympanum of the inflammation determined in the pharynx by the mucous plaques. However, it is not rare to see in the tertiary period gummous ulcerations of the nasal fossæ or of the nasopharynx extend to the orifice of the tube, and cause a more or less grave deafness. Facts of this kind are already well known, and I have no intention of dwelling on this subject to-day.

The labyrinth and the auditory nerve may be attacked by syphilis in the different stages of its evolution, either primarily outside of any other lesion of the auditory apparatus, or secondarily by propagation of the affection from the middle ear to the internal ear. In this latter case the communication occurs by the direct vascular connections which exist between the vessels of the tympanum and those of the cochlea. When the internal otitis is "isolated,† either the auditory nerve is attacked (Braun), or the disturbances are produced by osseous or congestive lesions of the walls of the labyrinth." Observations of deafness consecutive to syphilis of the labyrinth are numerous enough to allow us to describe the principal symptoms and the course of this affection.

* Read before the Société Française d'Otologie, de Laryngologie, et de Rhinologie, May 2, 1892 (*Bull. et mém. de la Société*).

† Baratoux, "De la Syphilis de l'Oreille," *Revue de Laryngologie*, 1886, p. 27.

One of the chief characters of syphilitic internal otitis is the rapidity with which it develops. In some months, some days, sometimes even suddenly, the deafness is established, completely or nearly so. Intense tinnitus and frequent and very troublesome vertigo ordinarily accompany the deafness. The latter, however, sometimes develops little by little, to remain stationary a long time until a moment when, for an ordinary cause or without known cause, there occurs a sudden aggravation. At the same time that these symptoms occur, the patient quite often has ocular troubles (iridochoroiditis); he complains of acute pain, sometimes limited to the region of the ear, but which more often affects the form of cephalalgias, with evening and nightly aggravations. Facial paralysis often occurs with syphilitic internal otitis. Seaton, Seligsohn, etc., have reported examples of this: "This paralysis is produced * either in consequence of a communication from the facial with the trunk of the auditory and the first turn of the cochlea (Seligsohn and Buch), or by the internal relations of the aqueduct of Fallop with the auditory apparatus (Braun), or, better, because of hyperostosis of the internal auditory canal."

The deafness often occurs without any known external cause, outside of the syphilis; however, it may sometimes occur because of a chill or of an insignificant blow on the head. The alteration of the hearing is usually grave, often touching total deafness. The tinnitus, which is always intense, fatigues the patient very greatly, and may even disturb the sleep. The tinnitus is constituted by noises of bells, musical sounds, strident whistles, the wind sighing in a tempest. With regard to the vertigo, it is more or less frequent and does not present any particular character.

On examination we find all the symptoms which characterize diseases of the inner ear. In a great number of cases, the tympanum and the drumhead are normal, or present lesions which are little marked and insufficient to explain the deafness and tinnitus, and especially their sudden appearance. Besides, it is on these facts that Roosa bases his op-

* Baratoux, *loc. cit.*

position to the opinion of Sexton, who maintains that the sudden deafness of syphilitics results from a lesion of the apparatus of transmission. "Granulomas," says he,* "develop rapidly in the tympanum, and the chain of bones is obstructed in its movements." The failure of mechanical treatment, the tinnitus and the vertigo associated with the facial paralysis, the relief to audition in a noise, all are abundant proof of the central nature of the affection. The examination of the ear with the watch and the tuning fork again confirm this diagnosis. The cranial perception of the watch is abolished or markedly diminished, *even when there still exists a very good degree of hearing*. In marked deafness, the tuning fork is not heard when applied on the skull, and, in all cases it is heard much longer by the aërial passage than by the cranial.

Syphilis of the labyrinth may present as a mono-symptomatic accident in the course of general syphilis; it most often occurs during the evolution of the disease in the secondary or tertiary periods. The symptoms which characterize it are the same in the various periods, and it would be difficult, and also useless in a practical point of view, to establish an exact distinction between the secondary and the tertiary symptoms of syphilis of the labyrinth. Very rarely the auricular lesions and the deafness follow suddenly after the appearance of a chancre and before any secondary manifestation. Politzer has reported a case of this kind. In this point of view, the observation which follows appears interesting and worthy of report:

CASE IV. J. B., aged twenty-eight, came to the polyclinic of Toulouse, November 20, 1891. The hereditary antecedents present nothing in particular. Mother died at forty-five of a uterine affection. Father living and healthy. Of nine children seven are living and healthy. Personally, he only remembers during childhood a tumor on his arm which he carried for three years. An abscess having formed communicating with the scapular-humeral articulation, it was opened and emptied with care. At the same time the humerus was curetted over an extent of three to four

* Sexton, *Amer. Jour. of Otol.*, ii. 4, p. 301.

centimeters. Resolution was perfect, and since then the health has been excellent.

At the time of his arrival at the clinic, the patient complained of deafness especially pronounced on the right, following since some twelve days. He also suffered from violent tinnitus, which simulated the sighing of wind in a tempest, frequent vertigo and headache (frontal), especially pronounced at night. The examination of the ear gave the following results :

A. D. 2 cent.

A. S. 10 cent. Tuning fork better on the right.

The aspect of the drumhead is absolutely normal, the tube is open, and catheterism does not afford any relief to the deafness nor to the tinnitus. I then question the patient as to the personal antecedents. He affirms that he has never had syphilis. He is married, father of a family, his wife is healthy, and, since his marriage, he has had no relations with other women. The most minute examination of all parts of the body presents nothing—no glandular enlargement, no spots on the skin, no cicatrix on the penis.

In spite of the uncertainty in which the negations of the patient places me, and the negative result of the examination, the auricular symptoms so much resemble those of syphilis of the labyrinth that I gave the patient potassium iodide, three grams a day. Eight days later the patient returned. The vertigo, the tinnitus, the headache had disappeared. The hearing was markedly better. The patient always denying syphilis, I recommended him to return to me if he found the slightest derangement. A month after I saw my patient again ; his throat troubled him, and I found that the tonsils, the soft palate, and the palatine vault were covered with mucous plaques. Doubt was no longer possible. The patient was evidently in good faith, and his wife not being diseased, I pushed my researches and learned that two months before perceiving the first trouble with hearing, he had toothache, and had recourse to one of those dentists who operate in the open air. After the extraction of the tooth, the cicatrization of the wound was prolonged ; he suffered for nearly a month, and it was certainly the gum which served as the point of entrance for the syphilitic virus.

It was by basing ourselves on the usual course of syphilitic affections of the labyrinth, and also on the complete absence of le-

*Taken from my clinic by M. Simonin.

sions of the tympanum and of the external ear, that we were able in this case to establish the diagnosis which was afterward justified by the facts.

The more pronounced deafness on the right being established, so to speak, suddenly, and the absence of antecedents other than the chancre, which passed unperceived by reason of its abnormal seat and the little known method of its inoculation, rendered the hesitation quite natural.

The patient has been subjected to a very energetic specific treatment ; he has followed it rigorously ; we have examined him lately (April 30). The mucous plaques, which were very tenacious and very numerous, have absolutely disappeared. The tinnitus and the vertigo have not reappeared, audition for the watch by the cranium is normal on both sides, and the watch is heard on the left at 1m. 30, and on the right at one meter.

In terminating, I may be permitted to speak, on the gravity of syphilis, according to the mode of the inoculation and the point of the organism which serves as a point of entrance for the virus, of an hypothesis which to me appears rational and that is confirmed by a number of facts that I have observed during some years. As in inoculations of rabies, where bites on the face are more grave than those of the limbs and of the lower parts of the body, and determine more rapidly the onset of the rabies, so in syphilis, when the primary infection occurs in the throat, tonsil, on the lip or on the maxilla, the cerebral symptoms are much more to be feared, and occur much more often than when the virus has entered by the usual passage, through the genitalia. It is true that this is only an hypothesis, and I do not know if it has been advanced before now. In any case, I can support it by a number of observations in which the chancre has developed on the lip, on the tonsil, and where grave cerebral accidents have occurred some years later, in spite of very energetic treatment, which has been rigorously carried out.

JACOBSON'S NASAL CANAL: THE POSSIBILITY OF ITS RECOGNITION IN THE LIVING AND ITS PROBABLE RÔLE IN THE PATHOGENY OF CERTAIN LESIONS OF THE NASAL SEPTUM.*

BY M. LE DR. POTIGUET, PARIS, FRANCE.

Jacobson's canal represents in man the vestiges of the organ of the same name. Jacobson's organ, designed for olfaction, attains its greatest development in some mammals. In the sheep, for example, it consists of a membrano-mucous tube inclosing some ramification of the olfactory nerve; this tube is itself included in a cartilaginous sheath applied to each side of the nasal septum. In man, this organ is only rudimentary; the cartilaginous sheath is reduced to thin tongues or cylinders of cartilage (Jacobson's cartilages, or the accessory cartilages of Sappey) which lie on each side of the base of the quadrilateral plate and the point of the vomer,† and the membrano-mucous tube is only represented by a canal or *cul-de-sac* of small extent leading beneath these cartilages and situated now toward the inferior part of the cartilaginous septum.

Noted in man and illustrated by Fr. Ruysch,‡ then by S. Th. Sömmering in his magnificent plates on the anatomy of the olfactory organ,§ this small canal has been, since the

* *Bulletins et Mémoires de la Société de Laryngologie, d'Otologie, et de Rhinologie de Paris*, vol. i. No. 4.

† In thickenings of the antero-inferior portion of the septum, these cartilages play the important rôle indicated by Sandmann (Congrès International de Berlin, 1890), a rôle that we shall attempt to define in a succeeding study.

‡ *Thesaurus Anatomicus*, t. iii., 1703.

§ *Abbildungen d. Menschlich. Organe des Geruches*, 1809.

discovery of Jacobson's organ in mammals* (1811), mentioned in man by J. Fr. Meckel† and studied in the human embryo by Dursy.‡

In 1877 M. A. Kölliker used the organ of Jacobson in man as the subject of a monograph,§ and since then we find this small canal cited or studied in works or articles by Kölliker,|| Schwalbe,¶ Löve,** Quain,†† Zuckerkandl,‡‡ etc. So far as I know it has not been described in any French work. Neither Gratiolet,§§ nor Ch. Remy||| notes its presence in man.

Its existence in man is constant, says Sömmering. We cannot be so affirmative, at least so far as the adults and the aged are concerned. In the course of recent dissections (May, 1891), we have found it eighteen times. The search for its orifice is relatively easy in the cadaver. The eye, on a preparation carefully washed and carried to good daylight, by careful scrutiny of all the inequalities of the membrane, calling upon the probe for aid, finally discovers a crypt which is the canal.

On the head of the newborn, or of an infant of some months, it is always found, often preceded by a small groove, which leads into it. It has seemed to us that in the adult there is greater chance of finding it as the subject is young in years; this is due without doubt to lesions of the mucosa, dependent upon repeated coryzas, which with age probably cause obliteration.

In the living it is somewhat different. Moldenhauer, to our knowledge, is the only rhinologist who has attempted to

* Annales du Muséum d'Histoire Naturelle, t. xviii. Rapport de Cuvier.

† Handbuch der Menschlich Anatomie. t. iv; 1820. Cité par A. Kölliker.

‡ Zur Entwicklungsgeschichte des Kopfes des Menschen, etc., 1869.

§ Ueber die Jacobsod'schen Organe des Menschen, etc., 1877.

|| Ueber das Os intermaxillare des Menschen, 1882.

¶ Lehrbuch der Anatomie der Sinnesorgan, 1887.

** Monatschrift für Ohrenheilkunde, 1886.

†† Quain's Elements of Anatomy, Ninth Edition, 1882.

‡‡ Real-Encyclopædieder gesamten Heilkunde, Second Edition, 1888. Art. Nasenhöle.

§§ Recherches sur l'organe de Jacobson, thèse de Paris, 1845.

||| La Membrane muqueuse des fosses nasales, thèse d'agrégation, 1878.

recognize it ; his researches were in vain. "Although my attention has been directed to this point many times," he says, in speaking of the orifice of Jacobson's canal, "I have not been able to see it in the living." It is true, he describes it as surrounded by a rounded projection ; now, in the adolescent and in the adult, we find this orifice rather limited by a valve ; the projection scarcely seems to exist except in the very young child.

However, it is not impossible to find the orifice of this small canal on the living. Its discovery here is certainly in-

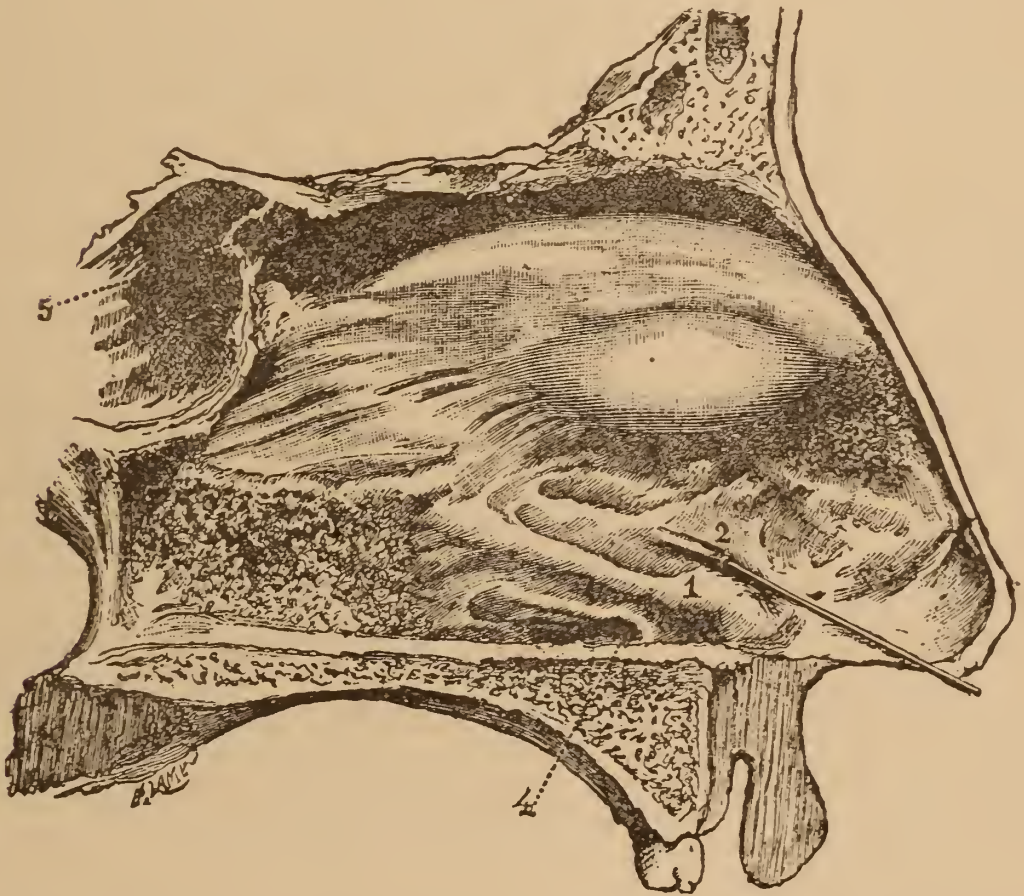


FIG. 1.—Septum of the nasal fossæ ; 1, projection caused by Jacobson's cartilage ; 2, orifice of Jacobson's canal ; 3, tubercle of the septum ; 4, nasopalatine infundibulum ; 5, opening of sphenoidal sinus ; 6, frontal sinus.

finitely less easy than on the cadaver, but, with a little care, and much patience, sometimes we find it, frequently at once, at other times after months.

To find the orifice, it is first necessary to learn where to seek it. It is situated above a swelling, running from

before backward, which, constituted in great part by Jacobson's cartilages, occupies the antero-inferior portion of the septum (Fig. 1). According to Kölliker's measurements, it has an average distance of eight millimeters and five from the floor of the nasal fossa, and twenty-four millimeters from the angle formed by membranous septum and the upper lip; it measures about one millimeter. The length of the canal, directed from in front backward and a little up-

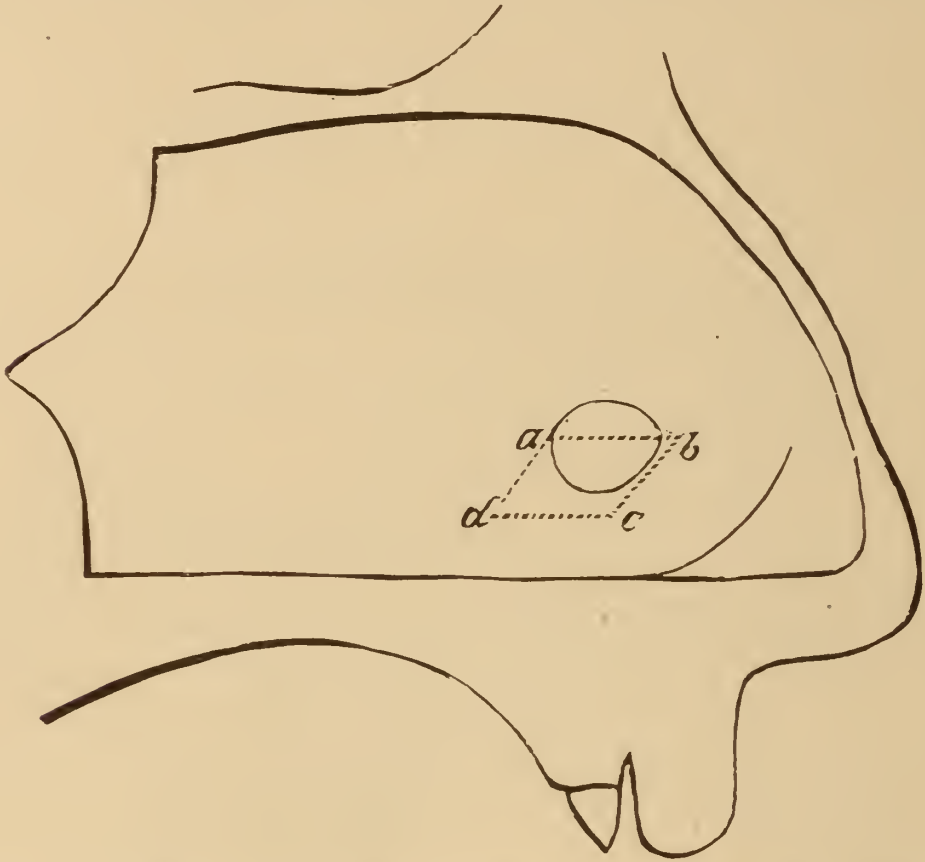


FIG. 2.—Schema of a perforated nasal septum (perforating ulcer? syphilis?) from a subject, 60 years of age; a, b, c, d, lozenge shaped space marked out by Kölliker's measurements.

ward, may attain nine millimeters (Schwalbe), but it only has an average length of four millimeters.

These are only averages. Jacobson's canal may open a little within or a little beyond these figures. By following the maximum and minimum distances indicated by Kölliker, we can circumscribe a somewhat lozenge-shaped space (Fig. 2, a, b, c, d), measuring seven millimeters in height and eight millimeters in length, in which the orifice is

almost always found at once. This space may be called the zone of research. Ulterior anatomical studies will enlarge it without doubt, the mensurations of Kölliker having been taken from only eighteen adult subjects.

Besides this our researches on the cadaver have taught us that Jacobson's canal is, on the same subject, very symmetrically placed, on the right and left, at a very equal distance above the floor of the nasal fossæ. But its length and the distance which separates its orifice from the nares, are subject to variations on the two sides of the same subject. This equality of the distance from the floor of the nasal fossæ on the same subject is a fact which may assist in the discovery of the orifice on one side, when the other has been found.

To see the facility with which the orifice of Jacobson's canal is found on the cadaver, would create astonishment at the difficulty encountered in its search in the living, but in the living the conditions are wholly changed.

First of all, for clear perception of details, no illumination equals direct solar light. Now, in our latitude, rhinoscopy can scarcely ever be employed without the use of the artificial light, which changes the color of objects and darkens the contours.

Besides, in ordinary use the rhinoscopic image presents a very oblique view of the septum.

In the third place, the mucosa of the septum is often covered, especially in the zone which interests us, either by a thin layer of dry mucus, having a varnished appearance from dessication, or by masses of *débris* of epithelium.

In the fourth place, the cartilaginous septum often presents, especially in its inferior portion, a tortuous configuration, and even when it is sensibly straight it very frequently presents toward the anterior limits of our zone of research, or in front of them, a slight vertical undulation.

Such are the principal circumstances which obstruct the examination of this part of the septum and oppose the discovery of the orifice of Jacobson's canal.

The first we must accept in part, as exploration of the

nasal cavities by direct solar light with a plane reflector can only be used as an exception.

The second may be remedied in part by directing the speculum so that the zone of research shall present to view as little obliquely as possible.

A tampon of cotton, wound on the end of a probe, should be used to wipe off the mucus and epithelium under the direction of a very light touch ; a hard pressure may cause a bloody oozing that would obstruct the view.

Beside these difficulties, I wish to mention those due to narrowness of the orifice of the canal and to its shortness.

In the most favorable cases, the eye can only suspect the entrance of the canal. A darker spot in the place we have indicated, a slight depression, a groove which is suddenly interrupted, give the thought that there lies the opening. But certainty can only be acquired with the probe. The probe should be very fine, six-tenths of a millimeter in thickness, perfectly blunt at its extremity. It is lightly pushed into the supposed orifice. If it penetrates into the mucosa three to four millimeters or more, we are assured that we have Jacobson's canal.

This is, then, often a laborious investigation, sometimes without object, since Jacobson's canal may be obliterated. Since August, 1891, our attempts have had a positive result in about 100 cases out of a little more than 200 subjects.

Is the game worth the candle? What does pathology gain by this small procedure?

We are convinced that many lesions occupying the region of Jacobson's canal and the canal itself should be recognized and consequently stopped in their progress.

Moldenhauer, after having noted the existence of this canal and related the failure of his researches, adds: "The canal of Jacobson remains without any importance in pathology."

It is hazardous to assert that one of our organs has no pathological importance. Alas! there is no one of our organs but may become diseased, and among these organs shall we except those which, like Jacobson's organ, are present

only in rudimentary state, the ileo-cæcal appendage, for example? We know the frequency of appendicitis. Will Jacobson's canal constitute the exception? In place of believing in immunity, it is better to believe that its affections have hitherto remained unrecognized.

It is worthy of remark that the region of the septum is important in a pathological view. The seat of the ulcerous syphilides described by Michelson, the perforations due to the same cause, the perforating ulcer described by Weichselbaum, Voltolini, Hajek, etc., all are found here. Here is the preferred site of recurrent epistaxis, of perforation from lupus, of the nodules of leprosy, and of perforations from certain infectious diseases, recurrent typhus, typhoid, etc.

A glance at Figure 2, apropos of this, will be particularly instructive. Note the perforation, produced by an unknown process (perforating ulcer? syphilis?), that we found in the cadaver of a man of about sixty years, the zone of research and the almost geometrical superposition of the perforation in this zone. Is there nothing of interest in this suggestive quasi-concordance?

Of this peculiar localization of morbid processes in a determined region of the septum, no general explanation has been furnished to the present day. It has been said on the subject of perforations, that their seat in this place finds a reason in the very great thinness of the cartilage here. But this explanation only treats of the greater or lesser facility with which a morbid process may involve the entire thickness of the cartilage; it tells nothing as to why the initial lesion, of which the perforation is only the termination, attacks this region rather than another. Does not Jacobson's canal play some rôle in this preference? In perforating ulcer, notably its seat and its form, as well as its symmetry on both sides of the septum noted in a case by Hajek,* does it not bring the thought that Jacobson's canal could not be foreign to its appearance in certain cases?

From the great number of cocci in the nasal cavities,

* *Virchow's Archives*, t. 120, 1890.

even in the normal state, Hajek reasons that this necrosing affection of the mucosa is due to the penetration into the depths of its glands of the staphylococcus and streptococcus pyogenes. From this it results that the large excretory ducts of the mucous glands are particularly exposed to the reception of these noxious agents which cause local irritation and inflammatory alterations of the epithelial covering of the mucous glands and their excretory ducts. Then the inflammatory products which remain in the excretory ducts, the blood clots which may form in consequence of hemorrhage, form a ground particularly favorable to the multiplication of bacteria. If such is the pathogeny of perforating ulcer, does it not apply remarkably well to the canal of Jacobson, which, in man, is only a *cul-de-sac*?

One is astonished that Hajek, in his remarkable study, has not attributed to Jacobson's canal even a small rôle. But we well know that clinical experience is sometimes slow to utilize the new ideas furnished by anatomists. The history of perforating ulcer of the septum is a good example. Although described in 1882 by Weichselbaum and Zuckerkandl, perforating ulcer continued unrecognized clinically to the time when Voltolini (1888), Rossbach (1889), and Hajek (1890) made it a distinct variety.

It should not be said, however, that lesions of the lower portion of the cartilaginous septum should all invariably begin in the *cul-de-sac* in question. It simply furnishes a condition favorable to their development, a condition due to its form and perhaps to its quality as a degenerate organ.

But these are only inductions and probabilities, and pathology cannot depend on such a fragile material. We have a strong suspicion that Jacobson's organ does not escape the common law, that it may, like others of our degenerate organs, be primitively touched by morbid processes, and that its rôle in the pathogeny of certain perforations of the cartilaginous septum is notable and far from being insignificant; but this is only a suspicion. We have seen lesions of lupus and exiguous syphilitic

lesions, exactly limited to the region usually occupied by Jacobson's canal, and which in two cases even recalled its shape in a striking manner.*

From the preceding study it follows :

1. That Jacobson's canal can, if not always, at least quite frequently be recognized in the living.

2. That, from this time, search for it has its place marked in exploration of the nasal fossæ.

3. That it becomes necessary to seek the relation which may exist between Jacobson's canal and the lesions occupying the region where it is found.

*No. 43. Multiple tertiary syphilitic lesions. Tertiary syphiloma of the upper pharynx. Elimination of a part of one of the wings of the sphenoid, perforation of the palatine vault, etc. In the left nasal fossa was a small cicatrix of the mucosa, of whitish gray, about four millimeters long by two wide, occupying exactly the situation of the canal of Jacobson.

No. 25. Lupus of nose and upper lip, extending on the right into nasal fossa. Red, bleeding granulations occupying the region of Jacobson's canal. This was followed by a horizontal perforation, four to five millimeters long by two wide, exactly occupying the usual seat of Jacobson's canal.

A FEW OBSERVATIONS ON THE USE OF THE JAVAL OPHTHALMOMETER.*

BY CHAS. M. THOMAS, M. D., PHILADELPHIA, PA.

There are probably very few of us who do not look upon the adjustment of refractive errors as the irksome part of an oculist's work, and who would not gladly avail ourselves of any proffered means which promises to shorten the time we now spend upon these cases. But beside the expenditure of time, which I may safely say is as much objected to by the patient as the doctor, the lack of a really exact means of determining the more complicated refractive states is, I think, constantly felt by us, and its absence not infrequently wondered at by our patients. The very fear that the result of the adjustment will be vitiated by the incorrectness of his statements, at times develops confusion in the sharpness of our patient's observation and repeated contradictions in his answers to what appear to him the inquisitorial-like questionings of the doctor. The remark, "I'm afraid, doctor, I shall lead you astray by my uncertain replies," is probably a most familiar one to all of us, and one, too, which contains more truth than the worthy doctor is usually willing to admit.

While the adjustment of simple myopia and hyperopia may be looked upon, with the aid of the ophthalmoscope, as comparatively an easy matter, I think the majority of us will not so view the question of *astigmatism* in its various manifestations.

The generally employed objective tests of refraction, by

*American Institute, 1892.

means of the upright image and retinoscopy, are admittedly but approximate in their results, and particularly unreliable in astigmatism ; the ordinary method, upon which the large majority of oculists still rely, is open, as already hinted, to the serious objection that it is *subjective*, and so depends for its accuracy upon the impressions of the patient, whose replies, as we all know, are only too often exasperatingly uncertain and contradictory, while with illiterate people and young children the difficulties met with are sometimes almost insurmountable.

As we know that so far as our present knowledge goes, the only correctable astigmatism lies in the varying curves of the cornea, inferentially, the natural and direct method of measuring this variation in curvature would be by an objective measurement of the corneal surface, and until we have established some means of accomplishing this, it is perhaps not too much to say that our treatment of astigmatism must remain unsatisfactory and often inexact. In the ophthalmometer of Javal it would seem that we have already at our command a fairly precise apparatus for accomplishing this end, and my object in offering these brief observations is to secure from those members who have employed the instrument their opinion as to its value in their hands, and at the same time, perhaps, to excite a more general interest in its use. Indeed, it is to me a matter of surprise that the apparatus, first presented by Javal ten years ago, should have remained so long comparatively unnoticed by the profession. So far as I know, but little has been published by those who have used it, beyond bare statements, more or less positive, in support of its utility. That its results are not absolutely exact is, I think, acknowledged by all, but as to the precise amount or character of its inaccuracy there seems to be a diversity of opinion.

In preparing the material for laying before you my experience with the ophthalmometer, I have taken from my case books the consecutive records of two hundred eyes, although a few cases were omitted where, on account of len-

ticular and corneal opacity, marked amblyopia, etc., a satisfactory subjective determination was impossible.

Of the total number of cases we found that one hundred and forty-four showed an astigmatism with the rule, *i. e.*, having the radius of greatest curvature approaching the vertical meridian; thirty-six an astigmatism against the rule; and twenty in which no astigmatism could be found. I might say, in passing, that though I have heretofore made no calculation as to the proportion of astigmatic to non-astigmatic eyes, in my own work it is from the above estimate pretty clear to me that astigmatism, particularly of low degree, has been more frequently detected since using the ophthalmometer than before.

In the 144 cases with the rule, we find that .5 D., or less, occurred 91 times; .75 D. 20 times; 1. D. 14 times; 1.50 D. 4 times; 1.75 D. 5 times; 2. D. twice; 2.50 D. 4 times; 3. D. once; 4. D. once; and 5. D. twice.

Up to 1. D. (this including, therefore, 125 of the 144 cases with the rule) my instrument was found to register very regularly fifty per cent. too high, *i. e.*, just double the amount of astigmatism found by the subjective tests. The exceptions to this were so few and trifling as to count for nothing. In fact, the results are so uniform that I would now have but little hesitation in prescribing up to 1. D. without subjective confirmation. This result, however, is quite different from that as given by Javal, who says: "In low grades of astigmatism with the rule, the ophthalmometric measure is twenty-five per cent. to fifty per cent. greater than the subjective tests with atropine."

From $1\frac{1}{2}$ to 2. D. the variation is not so great, as will be seen by the accompanying table, and ranges from $\frac{1}{4}$ to 1. D. greater by the ophthalmometer than that found subjectively. From $2\frac{1}{2}$ to 5. D. the result of the two methods is practically identical, and this showing is also at variance with the statement of Javal, viz.: "In marked astigmatism it (the ophthalmometer) may register from .5 D. to 1. D. too low."

<i>Subjective.</i>	<i>Javal.</i>	<i>Cases.</i>
.25	.50	42
.50	1.00	49
.75	1.50	20
1.00	2.00	14
1.50	{ 2.50	4
	{ 2.50	
	{ 2.00	
	{ 2.00	
1.75	{ 2.50	5
	{ 2.50	
	{ 2.50	
	{ 2.00	
2.00	{ 2.00	2
	{ 2.50	
2.50	{ 3.00	4
	{ 3.00	
	{ 3.00	
	{ 2.50	
3.00	3.00	1
4.00	4.00	1
5.00	5.00	2

Of the thirty-six cases against the rule, *i. e.*, with the meridian of greatest refraction at or near the horizontal, there were none found above 1. D. In this class the record of the instrument agreed precisely with the results of the subjective tests, requiring no modification except in two instances, where the .5 D. indicated by the instrument was not accepted by the patient.

When the ophthalmometer recorded but one-quarter D., with the rule, in twenty cases, no astigmatism was found; a result in accord with the statement of Javal. In the few cases where the ophthalmometer indicated an equality of curvature in all meridians, one-quarter D. against the rule was determined with much regularity, which is less by one-half the amount claimed by Javal.

To recapitulate briefly, I find that in astigmatism not above 1. D., with the rule, by deducting fifty per. cent., from the ophthalmometric measurement, I get a uniformly accurate result; from 1. D. to 3. D. it is necessary to subtract 1. D. to one-quarter D., the amount of required deduction decreasing with the increase in astigmatism; and finally,

for cases running above $2\frac{1}{2}$ to 3. D., no deduction is required.

When the meridian of refraction is greatest in the horizontal direction, and when no astigmatism exists, the instrument yields uniformly trustworthy results.

From the above it will be seen, therefore, that the statements furnished by the ophthalmometer as to the grade of astigmatism cannot safely be accepted literally, but require certain modifications. Whether this defect is a constant one, or varies in degree and character with different instruments, and whether this imperfection can possibly be eliminated from its workings are questions which can only be settled by free and careful application of it in practice and frank statements of results.

Personally I may say that I employ the apparatus with daily increasing satisfaction, though I do not feel, except in the lower grades of astigmatism, I could yet rely exclusively upon its evidence. It is, however, in the lesser degrees of astigmatism that determination by the subjective method is the most uncertain and trying, and if it were of no value except in these cases alone I should feel loath to part with it.

On more than one occasion I have corrected cases by the Javal, where, even with intelligent people, the fixing of the amount and grade of error seemed impossible by the ordinary methods.

A not inconsiderable advantage in the use of the instrument lies also in the possibility of dispensing with mydriasis in many cases; for so soon as one is satisfied as to the character and amount of astigmatism the determination of the myopia or hyperopia is commonly but a trifling matter, and can be estimated sufficiently accurately without subjecting the patient to the annoyance of a mydriatic.

As to the economy of time, I can, I think, safely say that in my own case the employment of the apparatus enables me to make corrections of refraction in, at most, half the time formerly required.

The location and measurement of the angle and grade of astigmatism is usually but the work of a couple of minutes,

and both my associate, Dr. Northrop, and myself, have frequently determined these points in ten seconds, confirming them afterward by the trial glass, etc.

By no means the least value possessed by the instrument lies in the rapidity and clearness with which it enables one to locate the angle of greatest and least refraction. In this particular its work is most gratifying and can, I believe, be implicitly relied upon; the patient in position, but a glance at the beautiful reflection of the dial upon the cornea is required to locate these lines to within a very few degrees of the exact.

The result of my experience, therefore, in the use of the ophthalmometer of Javal would lead me to conclude:

1. That its employment adds greatly to our certainty and rapidity in the correction of errors of refraction.
2. It enables us to dispense with the use of a mydriatic in a larger proportion of cases than by the ordinary method.
3. Its greatest value lies in the adjustment of astigmatism below about $1\frac{1}{2}$ diopters with the rule, and in all cases against the rule.
4. It shows the meridian of greatest and least refraction with remarkable certainty and rapidity.
5. Its precision is not sufficiently great to warrant one in relying upon it to the exclusion of other methods.

A CASE OF NASAL ANGIOMA.

BY HOWARD P. BELLOWS, M. D., BOSTON, MASS.

The infrequency of angiomatous growths in the nasal passages is a matter of surprise to all who consider the tendency to morbid activity and the peculiar vascularity of these parts. In all medical literature, up to the present time, I believe but ten well authenticated cases of nasal angioma have been recorded, together with some seven others whose nature remains doubtful. Of these ten cases eight occurred in males and two in females ; they developed for the most part in early life, had no satisfactory assignable cause, were slow of growth, and seemed to present no tendency to recurrence after removal. To this list of cases I am able to add another, which occurred in my own practice, and which presents several rather exceptional features ; the patient being a woman of middle age, the exciting cause at least assignable, the growth comparatively rapid, and a marked tendency to recurrence showing after complete removal, but undoubtedly favored by peculiar circumstances which arose at that time. I will proceed to report.

Mrs. —, aged thirty-seven, in good general health, presented herself at my office October 24, 1891, for examination and treatment of a tumor which was situated a short distance within the left nostril and entirely occluded that side of the nose. Upon examining the right, and unobstructed, nostril I noticed upon the side of the septum one or two scaly, dry scabs such as are of frequent occurrence in those who pick the nose. The patient admitted that she had followed this habit for some years and found it almost impossible to desist. About two months before her visit to me

she had noticed upon the left side of the septum a small raised spot which seemed rather different from anything which she had previously encountered, and from which she proceeded to pick the covering. The result was a profuse hemorrhage, which was checked after a time by ice held at the back of the neck, ice water sniffed up the nostrils, etc. From that time began the growth for which she sought treatment, and which in two months' time had so completely filled the nostril. Its size was that of a small chestnut, its shape somewhat flattened, with irregular outline and surface, and upon one edge lay superimposed a small, bud-like process.

Its color was a dark purplish red, and the most delicate use of the probe induced a hemorrhage which warned me to desist. No pain had been felt at any time, but hemorrhage was of frequent occurrence. A constant watery secretion, slightly irritating to the edge of the nostril, was a source of great annoyance, but, after all, the most disagreeable feature of the case seemed to be the mechanical obstruction to breathing.

I ascertained by careful manipulation that this tumor was attached to the septum of the nose at a point about half an inch within the nostril and by a pedicle about a quarter of an inch in diameter. Having secured a photograph of the growth in position, I proceeded to its removal by means of the Jarvis *écraseur*, preferring the cold steel wire to the cautery loop. Upon constricting the pedicle, the tumor slowly blackened and in some places became of a dark lead color. I occupied forty-five minutes in cutting through the pedicle by slow constriction, and was gratified in seeing less than a teaspoonful of blood when separation occurred. Beyond this immediate loss, no hemorrhage whatever followed the operation, healing was rapid, and after a few days the site of the growth could be found only with difficulty.

On the nineteenth of November this patient again came to my office with her whole appearance painfully changed. Her countenance was pale and haggard, and her eyes reddened from loss of sleep and much weeping. Four days before she had lost her husband, after nearly exhausting herself in nursing him during a painful illness. On the day before his death (that is, five days before this second appearance at my office and just three weeks after the day of the operation) she first noticed a little raised spot over the place from which the tumor had been removed. There was no pain nor sensation of any kind, but it had increased steadily in size, and

on the fourth day of the growth there had occurred a small spontaneous hemorrhage. I found upon examination a small sessile tumor, round in outline, with flattened top, about a quarter of an inch in diameter and rather more than an eighth of an inch in elevation, situated upon the site of the previous growth and resembling it in all respects except in shape. With a flat nasal probe and steady compression I succeeded in reducing its height by more than one-half. No pulsation was visible. I painted this growth with a saturated solution of the bichromate of potash and gave to the patient a vial of the same solution, directing her to continue the painting thoroughly every night and morning.

On the twenty-seventh of November I again made an examination, and found as the only reminder of the former growths a slight elevation, of grayish color. The applications had been made twice a day for eight days, and shrinking had progressed steadily since the second day. There had been more or less soreness, but easily borne. Brushing the membrane about the elevation with the point of a probe, a slight capillary oozing of blood was induced, which stopped almost immediately. No marked tenderness was apparent. I gave directions for the applications to be gradually discontinued, and in a few days more the last vestige of the growth disappeared.

My next, and last, personal examination was made nearly five months later, on the twentieth of April of this year. The surface of the septum was everywhere smooth and firm, and I could discover absolutely no sign of any recurrence of the growth, nor any further trouble whatever.

The tumor itself, upon the day of its removal, was sent for examination to S. R. F. Lanzius-Beninga, M. D., Lecturer in Pathological Anatomy at the Boston University School of Medicine. In due time there came from him a report, which I transcribe in full.

“The tumor from the nose of Mrs. ——— which I received from you for examination, and which in size and shape represented a cast of the interior of the nostril, was examined as follows :

“Sections were made with the freezing microtome from a small piece of one extremity of the tumor in the fresh state, and through its largest diameter after hardening in

alcohol. These were stained with hæmatoxylon—picric acid, hæmatoxylon picric acid-ammonia, hæmatoxylon-eosine and hæmatoxylon-eosine-picric acid-ammonia. The latter stain gave by far the best pictures.

“The sections show the same character throughout; a cavernous tissue composed of cells of irregular shape. The meshes of this spongelike framework are partly very large and partly small and have no special lining. They are either empty or partly or completely filled with blood. In some places the whole tissue is infiltrated with blood. Toward the periphery the cells, in most parts, become greatly elongated and arranged parallel to each other and perpendicular to the surface, the cavities between them disappearing. External to these is a narrow zone of cells of various forms but of nearly equal diameters in all directions. Lastly, forming the covering of the tumor, there are several layers of epithelium, which is squamous on the surface. The tumor, therefore, shows all the characteristics of a cavernous angioma.”

ON PEMPHIGUS OF THE CONJUNCTIVA AND IDIOPATHIC SHRINKING OF THE CON- JUNCTIVA.

BY C. KNOX SHAW, M. R. C. S. ENG., L. R. C. P. LOND.,
LONDON.

Sidney A., æt. fifty-five, first came as an out-patient to the London Homeopathic Hospital in April, 1889. He gave an unimportant family history, and had never had a day's illness till 1883, when he had a slight attack of gout. When a young man he had gonorrhea, but there seems no evidence to suppose he had syphilis. He has been a total abstainer for sixteen years. He has been liable to a papular eruption, but has never had any vesicles, bullæ, or sores. About Easter, 1887, he noticed one day after exposure to a severe wind that his eyes watered very much. This trouble continuing, he went to the Westminster Ophthalmic Hospital, where he remained under treatment till March, 1888, using various lotions without any apparent benefit. Upon the recommendation of a friend he took euphrasia internally and used a lotion of the same drug for a year without any improvement. In fact the irritability increased, and he lately noticed that he had a difficulty in moving his eyes; as he expressed it, "they seemed caught." When examined he was seen to have a general ocular and palpebral conjunctivitis; the lower conjunctival sac being partly obliterated by a firm, broad adhesion; there was also a short but firm band at each outer canthus limiting the movement of the eye. He had also well marked trichiasis, chiefly of the lower lids. In April he was admitted into the hospital and Jaesche-Arlt's operation for trichiasis done on the right lower lid, but with only temporary benefit.

While continuing as an out-patient, electrolysis was tried as a means of destroying the aberrant lashes. In September, an

elliptical piece of skin was removed from the lower eyelid of each eye with some permanent benefit. During all this time he was using locally either boracic acid or hydrarg. perchlor., and taking internally such remedies as arsenic, belladonna, hydrarg. perchlor., and bichromate of potash.

On January 30, 1890, the following notes as to his condition were made. Right eye: There is a marked tendency to inversion of the margin of the upper eyelid, causing the lashes to touch the cornea and bulb of the eye. The ocular conjunctiva is reddened; the lower conjunctival sac is almost obliterated, especially near the inner canthus, the lower lid appearing to be attached to the eyeball. The outer canthus is adherent to the eyeball by a firm, dense, conjunctival band. The upper conjunctival sac is lessened, but to a less degree than the lower. The conjunctiva itself is thickened and opaque, the surface being a dull white color in places, having somewhat the appearance of the mucous membrane of the lip. There is a sticky secretion which causes the lids to be agglutinated in the morning. Around the whole of the cornea, encroaching upon it from the conjunctiva and seemingly continuous with this structure, is a dull, opaque, whitish membrane, the free edge upon the cornea having an abruptly raised margin. The cornea is involved on the inner side to two-thirds of the distance between the corneal margin and the pupillary edge of the iris, and to a somewhat less degree on the outer side. There are many well marked vessels continued to the free edge of this opacity.

$V. = \frac{6}{24}$ with $\frac{\text{Sph.} + 1.5 \text{ D.}}{\text{Cyl.} + 1. \text{ D.}}$ ax. 180° v. $= \frac{6}{12}$ with $\frac{\text{Sph.} + 3. \text{ D.}}{\text{Cyl.} + 1. \text{ D.}}$ ax. 180° ; reads J. 2.

Left eye: there is a similar condition in this eye to that in the right, but to a less degree. The cornea is less involved, and here it is the upper third that is most affected; the margin of the opacity on the cornea is not so abrupt and has the appearance of a more general infiltration. The upper conjunctival sac is also affected, but not to the same degree as in the right eye. $V. = \frac{6}{12}$ with $+2.5 \text{ D.}$; reads J. 1.

He was again admitted to the hospital in February, 1890, and Burow's operation performed on both upper lids. At one of his previous visits to the hospital an attempt was made to treat the symblepharon by operation, but the conjunctiva was found to be

so very soft and friable as quite to preclude anything of that sort.

The patient was last seen in March, 1890, when he had no trichiasis, but the corneal affection had spread in the right eye so that it reached to the pupillary margin and in one small spot encroached upon the pupillary area. $V.=\frac{6}{80}$. There was also considerable increase in the corneal opacity in the left eye. $V.=\frac{6}{12}$.

While he was in the hospital the last time he complained for the first time of a soreness of the mouth and a tickling cough, with some huskiness of the voice. He was examined with the laryngoscope, and the epiglottis and the aryteno-epiglottidean folds were found to be much injected, and on the right one there was a small oval white patch which looked like a pemphigus bulla and appeared to contain pus. There is a similar bulla on the hard palate. No pemphigus spots could be detected anywhere else on the body, nor did any develop during the time he was under observation. After leaving the hospital he was examined by an experienced laryngologist, who reported that the man had "a good-sized patch of pemphigus occupying the right half of the epiglottis. It is red, elevated a little, and well defined. Rest of larynx healthy." Soon after this the patient was lost sight of, and he has not been seen since.

I have thought it best to describe this case fully before proceeding to discuss the many points connected with it, as it well illustrates the symptoms, course, and progress of a very rare form of disease of the conjunctiva. The case is one of intense interest both in its clinical aspect and in its pathological bearings. We had here to deal with a formidable progressively destructive disease which had almost blinded the patient when last seen, and which was almost certain to end in total and irrecoverable blindness; and about which our best ophthalmological text-books give but scanty information.

I am indebted to Mr. Anderson Critchett, to whom I showed the case as one of a peculiar form of conjunctivitis with symblepharon, for the first true insight into the nature of this unusual affection.

In order to gather anything approaching to a clear per-

ception of the characteristics of the disease, I found that I had to glean from many articles; for the literature of the subject is scattered among the pages of a good many journals and periodicals. Almost at the outset I was faced by a difficulty which it is not easy to solve without the personal observation of several cases, a condition almost impossible owing to the rarity of its occurrence. I am inclined to think that writers have confused two distinct diseases, and that the nomenclature used at the heading of this paper is not an interchangeable term, cause and effect, but represents two distinct pathological processes, allied in their clinical symptoms possibly, but not dependent one upon the other. To make this clear it will be necessary to describe rather minutely the special features of each disease, and then the varieties that have, to my mind, led to the confusion.

Among the rarer diseases of the conjunctiva there has been described an affection which has received, according to the pathological standpoint from which it has been viewed, the name, pemphigus of the conjunctiva, essential shrinking of the conjunctiva, or parenchymatous xerophthalmia. For several years past cases have been reported under one of the above headings in ophthalmic and other journals, and also have been brought before the notice of the Ophthalmological Society of the United Kingdom, and discussion has been raised as to whether they were all one and the same disease, or whether they, as Juler among others asserted, consisted of two distinct processes. From a careful perusal of the recorded cases, it is very evident that during an attack of pemphigus the conjunctiva may become affected. The disease, however, is undoubtedly uncommon, but during an attack of pemphigus one or more bullæ, containing a turbid liquid, appear upon either the ocular or palpebral conjunctiva. The bulla soon ruptures, and leaves a patch of gray-white membrane on the corresponding portion of the conjunctiva (Arlt, Schweigger, Sölberg Wells); this soon absorbs, and should the epithelium be shed, in more than one place, adhesions form between the lid and the globe. Arlt describes a contraction of the affected portion with

shortening of the conjunctiva, as following, even if no symblepharon be formed.

As far back as 1858, White Cooper recorded in the first volume of the Royal London Ophthalmic Hospital Reports a case of a woman, aged twenty-four, who had pemphigus of the conjunctiva coexistent with pemphigus of the arms, legs, and face. In Ranking's "Abstract," vol. ii., 1869, there is a condensed account of a case from Zehender's *Monatsblätter für Augenheilk.*, 1868. A man, aged sixty-eight, had suffered for twelve years from pemphigus; vesicles were noticed on the conjunctiva. The left eyelids became adherent to the globe; the right eye was similarly affected, but to a less degree.

In the *British Journal of Dermatology*, vol. i., 1889, Mr. Malcolm Morris describes and illustrates a case of pemphigus of the skin and mucous membrane of the mouth associated with pemphigus of the conjunctiva. He gives a table of twenty-eight cases that have hitherto been reported; in sixteen there had been true pemphigus of the skin preceding the eye affection; and in four the mucous membrane of the mouth and throat was first attacked. In the remaining eight the disease of the eye preceded any pemphigus eruption. In twelve only were vesicles ever seen upon the eye.

The development of an eruption upon the conjunctiva during a general pemphigus attack cannot, however, be very common, as Hebra is reported to have seen, up to 1873, two hundred cases of pemphigus without the conjunctiva being once involved in the attack.

There is another class of cases, in which after a long continued conjunctival irritation, that membrane becomes thickened, symblepharon forms, the conjunctival sac becomes obliterated, and the cornea encroached upon, but in which there is no sign in any stage of the disease of a pemphigoid eruption either on the skin or mucous membrane.

About 1870 Stellwag of Vienna described an affection of the conjunctiva which he named "syndesmitis degenerativa;" and which consisted of a gradual obliteration of the

conjunctival sacs. This was further described by von Graefe in 1878 as "*Essentielle Schrumpfung der Bindehaut*," or, as it has been translated, essential atrophy of the conjunctiva, though idiopathic shrinking of the conjunctiva seems better to express von Graefe's meaning and to more accurately picture the disease. Contraction of the conjunctiva had often been observed to follow severe long standing cases of trachoma, or followed traumatism from caustics or scalds; but Graefe, Stellwag, Horner, and others had noted, very rarely, shrinking of the conjunctiva from no obvious cause and accompanied by a slight conjunctivitis. To this disease was given the name idiopathic shrinking of the conjunctiva.

In 1883 Messrs. Critchett and Juler presented to the Ophthalmological Society of the United Kingdom (*Transactions*, vol. iv) a case which they described as a "peculiar conjunctival affection."

Hannah H., æt. fifty, married, health good. Nine months before had an attack of "cold in the eyes," accompanied by gritty sensation, muco-purulent discharge, and redness of the conjunctiva. Since then the eyes have never been quite well, but during the last six weeks the right eye has steadily become worse. Present condition—right eye: The whole fornix conjunctivæ is greatly thickened, so that both the upper and lower *culs-de-sac* are almost obliterated, and the upper lid cannot be everted. The ocular and palpebral conjunctivæ are also thickened and congested. The central three-fourths of the cornea are clear and unaffected, but at the circumference the conjunctival layer is seen to be thickened and opaque. $V. = \frac{6}{36}$.

Left eye: The cornea is unaffected. The ocular and palpebral conjunctivæ are slightly congested, but that of the upper *cul-de-sac* is becoming similarly thickened to that of the right eye. $V. = \frac{6}{18}$.

This case was again presented to the Society in November, 1885, by Mr. Lang, under whom the case had then drifted, as one of pemphigus of the conjunctiva, he believing in the view expressed by Reich, Steffan, and Schweigger that the disease described by Stellwag and Graefe was in reality

pemphigus of the conjunctiva, and that the disease could be confined to the mucous membrane of the eye only. Passing again under the care of Messrs. Critchett and Juler at St. Mary's Hospital the patient was brought once more before the Society, with a second case, as essential atrophy of the conjunctiva, as Messrs. Critchett and Juler could not satisfy themselves that the ocular condition was brought about by previous attacks of pemphigus. In the first case the eyelids were now adherent to the globe, the palpebral fissure was shorter and narrower than usual, the conjunctiva being replaced by a dry opaque membrane; the cornea was opaque, dry, and presented a dusky brown appearance. The vision amounted to perception of light only.

The second case was a man, æt. fifty, in whose right eye the lids were both thickened and shortened so that both the upper and lower *culs-de-sac* were obliterated and adherent to the globe. The lashes were incurved and the puncta obliterated. The cornea was vascular and steamy; the movements of the globe limited. The left eye was similarly affected, but to a less degree. In no part of the body could any trace of pemphigus be discovered, nor did he remember to have had any cutaneous eruption of this kind. The report of the case was concluded in these words: "Having, after the most careful and prolonged observation, failed to find any trace of pemphigus in either case, we are unable to consider the condition of the eyes to have been produced by that affection. On the contrary, we are inclined to look upon it as an essential shrinking of the conjunctiva brought about by a previous chronic inflammation and infiltration of that membrane and the soft structures beneath it, most probably due to syphilis."

Mr. Juler considered the two processes—pemphigus and essential shrinking—to be quite distinct, and that what had led to the present confusion was the occasional coincidence of the two processes in the same patient.

Mr. Treacher Collins ("Trans. Ophth. Society," vol. x. p. 62) describes two cases.

CASE I. Male, æt. nineteen. L. E. Conjunctival sac shrunken, symblepharon of lower lid about inner half. Cornea staphylomatous and covered with a fleshy membrane; partly red and vascu-

lar ; quite blind. T.—Eye removed. Layer on anterior surface of cornea, pinkish in color, differing from normal tissue of cornea. Microscopically: Epithelium on cornea much thickened ; the most superficial cells scaly. Epithelial cells as finger-like processes dip down into substance of cornea. Epithelium not limited by any layer as Bowman's membrane.

CASE II. Male, æt. thirty. R. E.: Lower conjunctival sac dry and nearly obliterated. Entropion of upper lid. Cornea opaque and dry. L. E.: Lower conjunctival sac also dry and nearly obliterated ; cornea opaque and dry. L. E. blind ; removed. The eye then examined ; on its surface a layer of some thickness and darker in color than rest of corneal tissue. Microscopically: Corneal epithelium thickened ; from surface processes of cells dip into fibrous tissue of the cornea. Round cell infiltration between superficial layers of fibrous tissue. Epithelium of conjunctiva much thickened, and processes dip down into it from the deeper structures.

Sattler (*Report of Twelfth Congress of Oph. Society at Heidelberg*, vol. xvii) showed microscopically that the conjunctival swelling was due to a swelling of the connective tissue bundles and partly from the expansion of the fissure spaces which were filled with liquid. The epithelium had totally lost its normal character, and consisted of horny cells. The two classes of cases which we have been considering—pemphigus of the conjunctiva occurring during a general pemphigus eruption and the conjunctival disease named by Graefe idiopathic shrinking of the conjunctiva—appear for some years to have been kept quite distinct until it was noticed that a third class of cases were described, and among them I would put that which I am now reporting, in which, after a long continued conjunctival irritation and when a gradual thickening of the conjunctiva with obliteration of the sac is well established, vesicles have been seen on the mucous membrane of the mouth or throat or on the conjunctiva or perhaps on small patches of the skin. Such reports and observations led Steffan, Schweigger, Baumler, Reich, and Lang to express the opinion that the syndesmitis degenerativa of Stellwag, and the idiopathic shrink-

ing of the conjunctiva of Graefe were in reality pemphigus of the conjunctiva.

Steffan of Frankfort, in the *Klin. Monatsbl.*, 1884, reports a case of a woman, aged seventy-three, with moderate conjunctivitis and a cicatricial condition of the left inferior conjunctival sac. There was some entropion with consequent irritation of the cornea. Without any obvious cause, the contraction of the conjunctival sac increased. The lids were not granular. The right eye became similarly affected, and the lower sac became almost entirely obliterated. Some months after the beginning of the disease typical pemphigus vesicles appeared on the eyelids and one was seen on the conjunctiva. A condition diagnosed as pharyngeal pemphigus was also noted. Schweigger (*Centralblatt für prakt. Augenheilkunde*, 1884) reports a somewhat similar case—chronic conjunctivitis with shrinking of the conjunctival sac. A few months later he observed a pemphigus vesicle on the scleral conjunctiva. The patient, a man, aged seventy, had been subject for years to the formation of vesicles on the mucous membrane of the mouth.

Again, during an attack of pemphigus all the above ocular symptoms may be observed without any vesicles or bullæ ever having been seen on the conjunctiva. In the *Centralblatt für prakt. Augenheilkunde*, 1882, Reich, of Tiflis, describes a case of a young man, aged nineteen, who for six years had suffered from pemphigus of the skin and mouth; he had epiphora, with a white and thickened palpebral conjunctiva, and his conjunctival sacs were shrunken. Schmidt-Rimpler records a case in the *Klinische Monatsbl.*, 1887, where there was undoubted pemphigus of the skin and fauces, but no eruption had ever been observed on the conjunctiva; the case, however, went on to symblepharon. He had seen an identical process associated with lupus and ichthyosis.

Dr. Wilkinson described in the *Jour. Am. Med. Assoc.*, vol. vii., the case of a lady, aged sixty-one, who for two years had inflamed eyes. A blister formed on the lids; when seen she had the conjunctival condition observed in all the above cases—entropion, trichiasis, with an abnormal development

of fine ciliæ along the lower lid; bands of symblepharon resembling a broad pterygium.

In the *Trans. of the Oph. Soc. of the United Kingdom*, vol. vi., 1886, Mr. Lang reports very fully in a paper on "Pemphigus of the Conjunctiva," a case of his; a young woman, aged twenty-four, who for ten years had suffered from pemphigus, which had appeared on almost every part of the skin; and which, when the patient was first seen, was still affecting the wrists, and there were two bullæ the size of a pea on the tongue. The lower conjunctival sacs were almost obliterated, the upper were very shallow, due to adhesions of the lid to the globe. The thick opaque membrane which joined the lower lid to the cornea had spread in front of the pupil, and vision was $\frac{6}{60}$. She had been supposed to have had granular ophthalmia with shrinking of the conjunctiva, but no granulations were visible. Burrow's operation had been performed for the trichiasis.

Dr. Cosetti, in a paper read before the Royal Institute of Science at Venice, and annotated in the English *Lancet*, vol. ii., 1888, states that of twenty cases collected by him all ended in complete and irreparable blindness, from the transformation of the conjunctiva and cornea into inodular cicatricial tissue. He alluded to the generally admitted fact that in many cases, though bullæ might appear on other mucous membranes, no eruption, even distantly resembling the bullæ of pemphigus, could be detected on the conjunctiva or cornea. Dr. Cosetti maintains that the atrophic puckering of the conjunctiva and the cicatricial degeneration of the cornea observed in such rare cases of pemphigus do not constitute nosological entity, but are to be attributed to the process known under the name of xerosis parenchymatosa of the conjunctiva, which is in itself the final result of a grave inflammatory process affecting the mucous membrane of the eye, such as trachoma and conjunctival diphtheritis. The influence of the dermatosis bullosa in determining the ophthalmic phenomenon in question would, according to Cosetti, be sufficiently defined as a local trophic disturbance due to general disease of a miasmatic kind and

affecting the conjunctival tissues. This trophic disturbance, and the eruption of bleblike vesicles on the mucous membrane of the palpebræ would result in the atrophizing sclerosis and the irreparable blindness that follows it.

In the third class of cases, which has been, I think, the confusing element in the discussion, the conjunctival disease exists long before any pemphigus develops, which then generally affects only a limited area, and even when these few scattered bullæ are seen, none are observed on the conjunctiva. May we not therefore assume that idiopathic shrinking of the conjunctiva is not caused by pemphigus, but that the occurrence of the latter disease in the course of the ocular affection bears the same relation to it as eczema does to phlyctenular keratitis and conjunctivitis? I think there is scarcely anyone who would now maintain that eczema and phlyctenular disease of the eye stand in the relation of cause and effect; but that, as De Wecker puts it, their simultaneous appearance is merely the sign of a feeble power of cuticular resistance in general. It appears to me, therefore, to be equally probable that a disease which can produce such deep-seated trophic changes in the conjunctiva and cornea might well be associated, in debilitated subjects, with such a tropho-neurosis as pemphigus. And there is this further point, in the pathological anatomy of the case which I now publish, and also in some of the others mentioned in this paper, which goes to show that the ocular lesion—idiopathic shrinking of the conjunctiva—is not a true pemphigus; namely, that there is, as well as the shrinking, a hypertrophy of the conjunctiva. Now, dermatologists teach us that pemphigus leaves no permanent scar, and that the absence of infiltration is a diagnostic point between this and some other affections of the skin (Sparks). Radcliffe Crocker ("Diseases of the Skin," 1888) states that there is no scarring except in rare instances (Steiner once saw it). This led Mr. Malcolm Morris to observe (*Lancet*, vol. ii., 1885) that these cases give more resemblance to scleroderma or rhinoscleroma than to pemphigus. Radcliffe Crocker writes that he has never seen true pemphigus attacking the

eyes and that Lang's cases (quoted in this paper) are open to question as whether they were due to pemphigus only. I think, however, the cases I have quoted in this paper conclusively show that pemphigus does undoubtedly, though rarely, attack the conjunctiva. It can be but little open to question that there is also a disease, which, for want of a better name, must still be called idiopathic shrinking of the conjunctiva, and which exists quite distinctly from any affection of the skin. And lastly, we must take cognizance of a group of cases in which both affections coexist, but that the association of the two diseases does not necessarily indicate that they are a "nosological entity" but that they represent two distinct processes.

SPASMODIC APHONIA AND DYSPNŒA.*

BY DR. A. ONODI, BUDAPEST.

Up to the present we have only possessed two complete observations, one by Michael, the other by Krause. Michael's patient, a woman of thirty-two years, hysterical, suffered from inspiratory dyspnœa and aphonia. All treatment remaining without effect, Michael decided to perform tracheotomy.

From the first inhalations of chloroform, the dyspnœa disappeared, and with the period of excitation the voice became wholly clear. The chloroformization was interrupted and the symptoms reappeared; the tracheotomy was performed. Three years after the operation, the functional troubles of the cords remained the same; the canula could not be removed.

The patient of Krause, a man of twenty-eight years, affected by multiple sclerosis, presented the signs of aphonia and of a spasmodic dyspnœa. At the end of fifteen days, Krause prepared to practice a tracheotomy, but first attempted painting with cocaine, ten per cent. This succeeded, the respiration was first relieved and then the voice.

Our patient was a woman of twenty-four years, hysterical, who had from time to time hysterio-epileptic crises; for a year and a half she has suffered at times from inspiratory dyspnœa and from complete aphonia; at one time of her residence in the hospital all had been prepared for tracheotomy. The inhalations of ether had better success. The respiration became better for some time.

* Read before the Société Française d'Otologie, de Laryngologie, et de Rhinologie (*Bulletins et Mémoires de la Société*).

When I saw the patient she was completely aphonic, with a very great inspiratory dyspnœa which increased.

The laryngoscopic mirror showed that, during phonation, the vocal cords approached strongly, then separated from each other ; during inspiration the narrow glottis did not widen ; during deep inspirations the cords approached and the dyspnœa increased.

Professor Jendraesik employed hypnotism on her with marked success.

After the first suggestion the patient was relieved from the dyspnœa and sang in a clear voice. The following day there was no difficulty in the respiration, but the aphonia had returned. Laryngoscopic examination showed that with inspiration the glottis enlarged to its maximum, but as soon as the patient wished to speak, the vocal cords pressed against each other strongly. After renewed sittings of hypnotism the dyspnœa and the aphonia completely disappeared.

This case is the third known, where the aphonia and the spasmodic dyspnœa appeared simultaneously. It is beyond doubt that in these three cases we have to deal with a contracture. In Michael's case, the respiratory spasm ceased after some inhalations of chloroform ; in our own, inhalations of ether succeeded for a time ; these two effects demonstrate the spasmodic nature of the disease. Michael did not obtain a cure ; it followed in our own patient from the hypnotism. In both cases, the symptoms observed relate to hysteria.

ORBITAL TRAUMATISM RESULTING IN IMMEDIATE MONOCULAR BLINDNESS.

BY D. A. STRICKLER, M. D., ST. PAUL, MINN.

I am led to report the following case by having recently seen a report of four similar cases, and by the fact that until seeing these cases reported I was wholly at a loss how to account for the symptoms presented in my case. I could not find anything in any of my works on diseases of the eye bearing on the subject, nor did any of several oculists to whom I related the case offer any satisfactory suggestions as to the nature of the lesion. None of them had seen a similar case.

Dr. Callan, in reporting the four cases above referred to, says that "there are not more than eighty recorded cases in medical literature."

CASE. George P., machinist, æt. thirty-six, called to consult me June 10, 1889, about his injured right eye.

History.—Yesterday, Sunday, about 9 A. M., on attempting to get into an engine cab, and while holding some tools in his right hand, swung himself up by the left, coming in violent contact with the end of a "washout rod" in the hands of a boiler washer. The end of the rod, which was about $\frac{7}{16}$ in. in diameter and roughly pointed, struck the upper right lid near its inner end causing a slight abrasion of the skin. The direction of the blow, as nearly as could be ascertained, was inward and upward, but there was no evidence that the rod had entered the orbit to any extent. The patient was stunned and slightly dazed for a few moments. There was severe pain, and immediate and total blindness of that eye. Thirty hours afterward, when first seen by the writer, the following conditions were noted:

Conjunctival ecchymosis, most marked at outer side of ball; the eye prominent, slightly everted, and turned slightly upward. Motion limited in all directions. No headache, no marked pain, but some general soreness. Pupil dilated ad maximum, does not respond to light. Total loss of light perception.

Ophthalmoscopic examination gave media clear; fundus normal.

Left eye normal in all respects.

The case left for his home in a different city and did not report until June 29, when he had O. D. vision=fingers at three feet. (As near as he could tell, had light perception first ten or twelve days after injury.) Pupil less dilated, eyeball moves much more freely; slightly everted and directed above the fellow eye. Ophthalmoscopic examination revealed pallor of the optic disc. The retinal arteries were narrower than normal.

The vision continued to improve until he ceased treatment on his own account on October 26, when it had reached $\frac{20}{30}$. The optic nerve showed partial atrophy which was more marked on its outer half. Arteries less narrow than they had been earlier.

June 6, 1892, I again examined the eye when I found the pupil dilated, the eye everted and turned slightly upward.

Vision $\frac{20}{30}$; with —r. D.^s.= $\frac{20}{40}$.

Ophthalmoscope showed more marked atrophy.

In studying this case at the time of treatment, I concluded that the injury had been to the nerve, but was at a loss to know, from the nature of the instrument, the direction of the force, and from the character and situation of the wound, *how* the nerve could be injured. I found nothing, in any literature on hand at that time, to help me out.

In the March 5 number of *The Journal of the American Medical Association*, Dr. Peter A. Callan reports four cases under the head of "Orbital Traumatism Resulting in Immediate Blindness Through Fracture into Foramen Opticum.

The history of his cases, in brief, was as follows:

CASE I. A thrust of a friend's foil, in fencing, broke through his mask and the buttoned point entered the right orbit between the nose and the eyeball.

Forty minutes later: The eyeball was somewhat protruded down and outward. Chemosis and ecchymosis of the lower ocular conjunctiva, with a slight irregular tear over the body of the internal rectus muscle. Eyeball immobile, pupil dilated, almost ad maximum and not responsive to direct rays of light, but acted consensually with its fellow eye. Total loss of light perception in the eye. Fundus slightly hazy.

A week later the protrusion and displacement had disappeared. The eye diverged, and the patient could control all the muscles except the internal rectus. Fundus normal, no haziness.

On tenth day patient, for the first time, had light perception on nasal side; pupil moderately dilated, somewhat responsive to direct rays of light. At the end of third week there was well marked beginning atrophy of the optic nerve.

Later: Well marked atrophy ensued. Light perception in small sector of nasal field remained. Pupil larger than the fellow eye, and eye divergent.

CASE II. Was struck over the left eye, supposedly by the fist of a rival. For a moment was stunned and dizzy, but did not fall nor become unconscious. He immediately noticed blindness of the right eye; bled from the nose and vomited blood; suffered from shock.

Fifteen hours afterward when first seen by Dr. C., there was slight abrasion of the skin of the upper left eyelid with some œdema of both upper and lower lids. Movements of left eye normal. Fundus normal, but eye astigmatic. Right eye totally blind. Movements of ball normal. No divergence, no protrusion, some conjunctival injection. Pupil widely dilated and only consensually responsive to light. Fundus normal. Seventy-two hours after injury ptosis marked. In ninety-six hours ophthalmoplegia. In one week the optic nerve of right eye began to grow pale, and in three weeks the atrophy was marked. In two weeks he first noticed light perception in the upper nasal field. Could move the ball to a slight extent, and ptosis less marked.

Six weeks after the injury the movement of the eyelid and ball had greatly increased; slight divergence; pupil less dilated. "Can form a fair estimate of large objects held about eighteen inches in the upper nasal field. The atrophy of the optic nerve has increased with the disappearance of the capillaries and total pallor of the disc."

CASE III. Was struck over the left orbital ridge with a lighted lamp thrown at him from a distance of ten feet. The blow dazed him, and he staggered back against the wall, which prevented his falling. He felt slightly dizzy, but had no nausea or other symptoms of shock. Fell asleep within a half hour, and on awaking six hours later discovered that he was blind in the left eye.

Examination revealed an irregular wound $1\frac{1}{2}$ in. long, extending up and backward from under edge of the left eyebrow, likewise a slight abrasion of skin on eyelid. Marked œdema of both lids; slight displacement of eyeball. Pupil moderately dilated, with total loss of light perception of left eye. Four days later œdema greatly increased, with chemosis of eyeball. Eyeball slightly displaced downward and outward. One month from date of injury was first seen by Dr. C., when the following conditions were found: Œdema of the lids had disappeared. Conjunctiva slightly red. Pupil moderately dilated; did not react to direct rays of light, but acted consensually with fellow eye.

Ophthalmoscope revealed pallor of disc; fundus otherwise normal. Vision nil. Right eye normal.

Three weeks later: Divergence not so marked; pupil moderately dilated, "but there was enough vision gained for patient to count fingers at eight feet." More marked pallor of disc.

Six weeks later: Vision remained the same. Atrophy of nerve more marked.

CASE IV. Fell from track of elevated railroad. Bled from right ear and nose. Left side of face and head contused, with wound of left orbital ridge. Patient semiconscious.

Three days later, when first seen by Dr. C., patient lay in a stupor. When aroused, complained of great pain all over the head. Left eye blind; pupil slightly enlarged; did not react to light, though slightly consensually with fellow eye. The eyeball was slightly diverged, not protruded.

Ophthalmoscope showed normal fundus. Right eye normal in all respects, save slightly contracted pupil.

Two weeks later, decided pallor of optic nerve.

Four months later, pronounced atrophy of left optic nerve. No light perception.

The doctor refers to four similar cases reported by Lawrence in his work on the eye and to three cases reported by

R. Berlin at the meeting of the German ophthalmologists in Heidelberg in 1879. Based on the frequency with which the optic foramen is involved in fractures of the base of the skull, R. Berlin thought that these and similar cases in which monocular blindness follows immediately upon a blow on the brow or about the orbit, are due to fracture extending into the foramen opticum and the consequent compression of the optic nerve.

As is pointed out by Callan, it seems but natural that the force of a blow on the brow, or about the orbit, should be transmitted along the continuous line of sutures formed by the union of the frontal bone with the nasal, superior maxillary, lachrymal, and ethmoid bones, until it reaches the lesser wing of the sphenoid. Here, owing to the bifurcation of the suture line, the force would be unequally expended along the two lines of suture and the consequent strain at this point might readily result in fracture into the foramen opticum.

So far as I know, in no reported case in which the injury was not more severe than in Dr. Callan's cases, or in mine, has a *post-mortem* examination been made to prove or disprove the diagnosis. From this it is seen that the diagnosis of fracture into the optic foramen is problematic, but, as it seems to me, very probably correct. Sufficient cases have been reported to show that there is a class of cases having in common, following a blow on the brow or about the orbit, immediate monocular blindness; dilated pupil, not responsive to direct rays of light; divergence and protrusion of the eye, with a fundus normal or nearly so immediately after injury, followed within a couple of weeks by first pallor of the disk and later an atrophic condition of the nerve. In many of the cases partial vision is regained. The eye remains divergent, with dilated pupil.

These symptoms being common to all the reported cases, must, it seems to me, be due to a common lesion. The most plausible explanation yet offered is fracture into the foramen opticum.

Works on the eye are strangely silent on this lesion.

Wells, Juler, Nettleship, Landolt, Buffum, Swanzy, De Schweinitz, and others make no reference to it at all. Schmidt-Rimpler, Berry, Mittendorf, and Harlan refer to its occurrence, particularly in connection with fracture of the base of the skull.

Noyes, in his latest edition, gives a short description of the lesion and is the only one in my reach who does. His remarks are based on Berlin's analysis of von Hölder's examinations of fractured skulls.

My case differed from Callan's and other reported cases in the final results. Callan says "some regain enough vision to count fingers at some feet."

Mine regained vision of $\frac{20}{30}$, which later fell to $\frac{20}{40}$. Whether the better vision in my case was due in any degree to the treatment given, or not, I am unable to say. The symptoms following the injury were as marked as in two of Dr. Callan's cases. The eye remained blind as long, but, of course, I have no definite knowledge of the relative amount of injury to the nerve at the time of the accident.

The treatment in my case consisted at first of cold arnicated compresses with arnica internally. After the ecchymosis had disappeared and the pallor of the disk was noted the patient received phos. internally and electricity locally. Both the galvanic and the faradic currents were used, but principally the former.

GLAUCOMA IN AN APHAKIC EYE.*

BY E. H. LINNELL, M. D., NORWICH, CONN.

In the *Archives of Ophthalmology* for last April is an article by Dr. H. Knapp "On Glaucoma after Discission of Secondary Cataract." In the introduction he makes the following remark: "Glaucoma, following sooner or later simple or combined extraction, prior to any after-operation, has been described by different authors. No such case, to my recollection, has occurred in my own practice." Although he records an increasing number of cases of glaucoma following discission of the capsule after extraction, his immunity from such a sequence of the operation where no secondary opening of the capsule has been done is no doubt due in large measure to his well recognized skill and dexterity as an operator. Singularly enough my only case of this kind followed my first operation for extraction of senile cataract, and while it may have been due to my lack of skill and experience, it seems sufficiently unusual to justify publication.

On the seventh of November, 1880, I made a preliminary iridectomy on the left eye of Mrs. T., aged seventy-four. The zonula was so relaxed that as the aqueous was evacuated the lens pressed forward into the anterior chamber. The incision of the iris was followed by considerable hemorrhage, which was very slowly absorbed. The wound healed promptly, but as the anterior chamber was re-established, the lens did not recede as I anticipated, but remained at one point in contact with the cornea, pressing the iris before it. Very little reaction followed. There was some pericorneal injection, and after ten days the tension be-

* Homeopathic Medical Society, County of New York, October, 1892.

came very slightly increased, but she complained of no pain. Eserine promptly reduced the tension, and on November 23 I removed the lens through a Liebreich's incision made upward instead of downward. The operation was done without anæsthesia or speculum, but in spite of every precaution, considerable fluid vitreous was lost. The corneal incision healed slowly, with slight purulent infiltration which was treated with rhus, and locally a warm solution of calendula. The patient was discharged on the eleventh day, and two weeks later, with suitable glasses, she had a distant vision of $\frac{20}{50}$, and read .5 Snellen easily, a very satisfactory result for my first case, considering all the complications. No dissection was made, and the patient used her eyes satisfactorily and freely for more than a year. On the eighth of April, 1882, she presented with a vision of only $\frac{20}{100}$ and with tension slightly increased. Eserine was prescribed, one grain to the ounce, without internal medication. I saw her again May 1, when the tension was about normal, but vision was the same. Eserine was continued and bell. prescribed. She did not come again until November, 1883. She said she discontinued eserine after the previous visit, but for two weeks she had had trouble with her eye again and had been using it as directed. Vision was then $\frac{20}{200}$ and the tension slightly plus. A two-grain solution of eserine was now given her, and she disappeared until January, 1885, when her condition was substantially as last described. Eserine again reduced the tension, and vision rose to $\frac{15}{50}$, better than at any time since the extraction. Another and more severe relapse soon followed, and she then consented to an operation.

There was from the first a pronounced physiological excavation of the optic disc which gradually assumed a glaucomatous appearance by a more abrupt curvature of the vessels at the periphery.

On March 27, 1885, I made a broad iridectomy downward. There was again considerable hemorrhage, not from the conjunctiva, but from the iris, as soon as it was touched with the forceps. The incision healed promptly, but the anterior chamber was not free from blood till the ninth day. Vision rose again to $\frac{20}{70}$, and she has had no more trouble with the eye during the last seven years, using it very freely, reading for hours at a time.

The interesting points in this case are the development of glaucoma in an aphakic eye two years after extraction, repeated slight attacks during a period of two and a half

years more, always controlled by instillations of eserine and the indicated remedy (bell., bry., or gels.), the complete and permanent recovery after iridectomy, and the absence of any glaucomatous tendency in the other eye. It is worthy of remark in passing, that an immature cataract which was present in the other eye at my first examination has never developed, vision remaining about $\frac{20}{100}$, and that during these twelve years she has worn a concave 4.50 D. before that eye by preference, with a plus 8.00 D. before the operated eye.

It is not easy to account satisfactorily for the development of glaucoma in this case. There was a very trifling entanglement of the iris at one corner of the incision following the preliminary iridectomy, the purulent infiltration of the corneal wound was very circumscribed and did not extend to the scleral margin, and I never have been able to discover any positive evidence of adhesions in the iritic angle.

Of course I ought to have immediately removed the dislocated lens in the first instance, but it seems hardly probable, when we remember that the symptoms were immediately relieved by extraction, that the pressure upon and the stretching of the iris which it occasioned could have resulted in a permanent injury which was the exciting cause of a glaucomatous condition developing two years afterward, the eye during these two years being apparently perfectly healthy. It seems hardly probable either that the slight entanglement of the iris in the scleral wound should have occasioned it after so long a time.

We know that a myopic eye is less prone to the development of glaucoma than a hypermetropic one, and "the senile changes which induce cataract seem ordinarily to furnish immunity against glaucoma." It is possible that adhesion of the periphery of the iris may have resulted from the pressure of the luxated lens, but the very tardy development of glaucoma from such a cause is under the circumstances unusual, and, if we suppose an inherent tendency to glaucoma, is it not surprising that no such condition has developed in the other eye?

FATAL TETANUS FOLLOWING INJURY TO CORNEA.

BY E. G. RUST, M. D., WELLINGTON, O.

A short time ago a lady, aged forty-five years, of plethoric habit and scrofulous diathesis, consulted me, at my office, in regard to an injury to the eyeball which she had received two days previous. She stated that she had received the injury in the following manner: She had procured for her little son a miniature bow and arrow. The bow was of steel, about six inches in length, one-eighth of an inch in width, and one-eightieth of an inch in thickness. She had attached the bowstring to one end of the steel, and was attempting to fasten the cord to the free end of the bow, when suddenly the bended steel sprung from her fingers and struck her on the eyeball.

Thinking the injury of very little importance, she had neglected doing anything in regard to it, until now (two days after receiving injury), when, on account of increasing pain in the eye, she had thought best to seek advice. Careful examination of the eye, ophthalmoscopic and otherwise, revealed in the lower portion of the cornea a wound one-sixteenth of an inch long. The wound was directed from below upward and perforated the anterior chamber. Neither the sclerotic, the lens, nor the iris received any discernible injury. Inspection of the steel bow showed it to be intact, thus precluding the possibility of any portion of it being within either the eye or the orbit.

A slight iritis followed the injury. The corneal wound was healing kindly and everything progressing favorably until eight days had elapsed, when untoward symptoms appeared, rapidly developing into the most pronounced, complete tetanus.

Several physicians were called in consultation, but the treatment

did little to modify the tetanic convulsions or unfasten the firmly locked jaw. The tetanus became steadily more marked, the patient dying on the eighteenth day from date of injury.

The family refused to allow any operation to be made, or enucleation would have been performed, hoping to thus arrest the disease. It is to be regretted that no autopsy could be secured.

I have reported this case because I have hitherto not known of tetanus following a like injury to the cornea.

NOTES ON WORD-BLINDNESS AND ITS CONCOMITANTS. A FRAGMENTARY CONTRIBUTION.

BY H. H. CRIPPEN, M. D., AND F. F. CASSEDAY, M. D.

Observations on cases of mental blindness, especially blindness for words, are so very rare that the following,* although incomplete by reason of recovery without autopsy, will be worthy of attention and of accompanying notes.

In the early part of 1892 a married woman of thirty-four years, consulted me for the purpose of obtaining relief from difficulty in reading. Although she had formerly enjoyed excellent vision, she now found it impossible to read a single word, whether written or printed. This trouble dated from her last confinement, three weeks previous. On examination, I found an hypermetropia of 2. D. in both eyes, for which the patient had worn the proper correcting glasses during several years past. With these glasses the visual acuity was perfect. The ophthalmoscope showed a slight hyperæmia of the fundus, but no cloudiness of the outlines of the optic disc. Color vision was perfect, but there was a slight concentric narrowing of the visual field, resembling that of hysteria.

On testing the near vision, with proper lenses, strange to say, the patient could name the separate letters of No. 1 Jäger without the least hesitation, but could not read a word, even of the No. 9, for the reason that she could not assemble the letters to form words. Verbally, however, if words were spelled to her she named them without hesitation (absence of word-deafness). She could write long letters of perfect coherence, but could not

* Reported by Dr. H. H. Crippen.

read what she had written. Her mental condition, outside the verbal amnesia, was perfect, and, physically, she was in her usual good health. All the reflexes were unaltered, and the patient's chief complaint was of the inability to read. Careful questioning elicited the presence of occipital headache, slight vertigo at infrequent intervals, and insomnia. The condition apparently depended on embolus of a cerebral vessel supplying a locality in the brain, presently to be described. The reason for such decision depended on the fact that the condition dated from the second day following her confinement, when the patient sprang out of bed, during her nurse's absence, thinking her baby was choking.

The character of the headache and the insomnia led me to prescribe gelsemium. A week later, the patient reported entire relief from these symptoms, but the inability to assemble letters to form words remained the same. As a careful review of the past history of the patient presented, to my mind, a grave suspicion of an hereditary specific condition, I recommended iodide of potassium. Following this, I lost sight of the patient on her removal to another State. A short time ago, however, she wrote that my prescription had been faithfully taken, with the result that a month after removing from my care the ability to read had returned suddenly, and that now there was no difficulty in recognizing words of any character.

A parallel to this case has been reported by Dr. H. Armaignac.* Here, however, the recovery of the power of reading was obtained by the patient being taught, like a child, to put letters together to form words, and the cure occupied a duration of more than two years.

It is evident that these cases constitute a variety of *apraxia*, or loss of memory of the nature and uses of surrounding objects. The patient recognizes letters, but has forgotten their use in the formation of words. Nearly all varieties of mental blindness, with the concomitant conditions on which we wish to make brief notes, fall within the meaning of this term.

In the consideration of those conditions that naturally relate to this loss of power, and that are its concomitants, it will be necessary to have certain definitions properly

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fixed in mind. *Apraxia* has already been given; besides this, we have :

Amnesic aphasia, loss of memory of words.

Alexia and *dyslexia*, sometimes given as synonymous, but, more correctly, the former implies word-blindness, pure and simple, while the latter should be related to cases in which there is ability to read a few words, after which the memory for the assembling of letters to form words becomes exhausted and the patient cannot go on.

Agraphia, in which the pen cannot be used. Under this heading are classed three conditions, loss of copying written or printed letters, loss of writing from dictation, and loss of the power of voluntary writing. It is evident, then, that we may have either a sensory or a motor agraphia and that the former variety may be due to word-blindness or to word-deafness.

In *paralexia*, the patient in reading substitutes words for those on the printed page before him : while in *paraphasia* there is a tendency in speaking to substitute words or phrases other than those intended by the speaker.

The conception of word-blindness, in its philosophical relations with other losses of mental faculties, may be well understood by instituting an analogy with Dr. M. Allen Starr's diagram of the mental processes involved in the conception of images and of their physical basis (Fig. 1).

Speaking of this diagram and the manner in which it illustrates the conception of mental images, Dr. Starr gives the following :

“ Objects and actions are the chief subjects of thinking, and their mental substratum is not difficult to discover. Take an example. A steel pen has a certain shape and size and consistence which I see and feel. The shape and hardness perceived by the eye and finger are associated and are remembered, and the mental substratum or idea of the pen consists of these two memory-pictures joined together. Other pens have forms of their own, and of them, too, I have a series of memory-pictures. But the ideal of the object is only made complete when its use is known. And

so to the memory of the pen is added another of the act of writing; itself a complex image, for that act has been watched and practiced before being acquired, and its recollection involves the recalling of those memories of activity of which I have been a spectator or participant. The mental image of the action is associated with the various

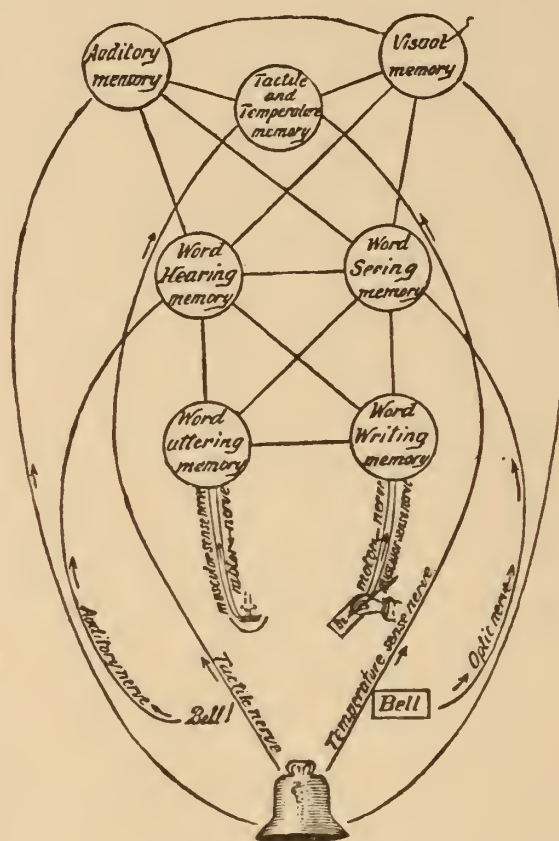


FIG. I.—Diagram to illustrate the Concept “Bell,” and to show the varieties of Apraxia and Aphasia. The memory-pictures are relics of past perceptions received through different senses. Their association makes up the mental image bell. The word image is made up of the memories of the sound and appearance of the word, and of the uttering and writing-effort memories: these are joined together. The mental image and the word image are also joined with one another, making up the concept “bell.”—(Starr.)

mental images of different kinds of pens, so that it forms a common basis for the formation of a general idea of a pen as an object used for writing. And this idea, complex as it is, made up of numerous memory-pictures, is acquired by the mind through observation long before language is used. The baby may try to write before it can say ‘pen,’

or before it can describe the act of writing. The words, then, are added to the mental image to make it communicable to others, but are not essential to the idea.

"A bell has, as its mental basis, four distinct memory-pictures; it has weight, form, a cold smooth surface, and sound; in fact, every object, if thus analyzed, will be found to vary from every other in respect of the memory-pictures which form its mental substratum. The figure shows the various kinds of memory-pictures and word-images making up the concept 'bell.' What is true of these single words will be found to be true of every other, if the trouble be taken to analyze one's subjective knowledge of them—an analysis full of interest."

In relation with Dr. Starr's diagram we also desire to present a design (Fig. 2) which has been used by M. Magnan* to illustrate the location of these memory-pictures in the brain, as well as their association.

It is interesting to note that this diagram is adopted by Mlle. Skwortzoff as explanatory of the different forms of aphasia, among which is placed word-blindness. It is therefore worth while to give careful attention to the dissertation on this diagram (Fig. 2) which we find in her able work on "Blindness and Deafness for Words in Aphasia":

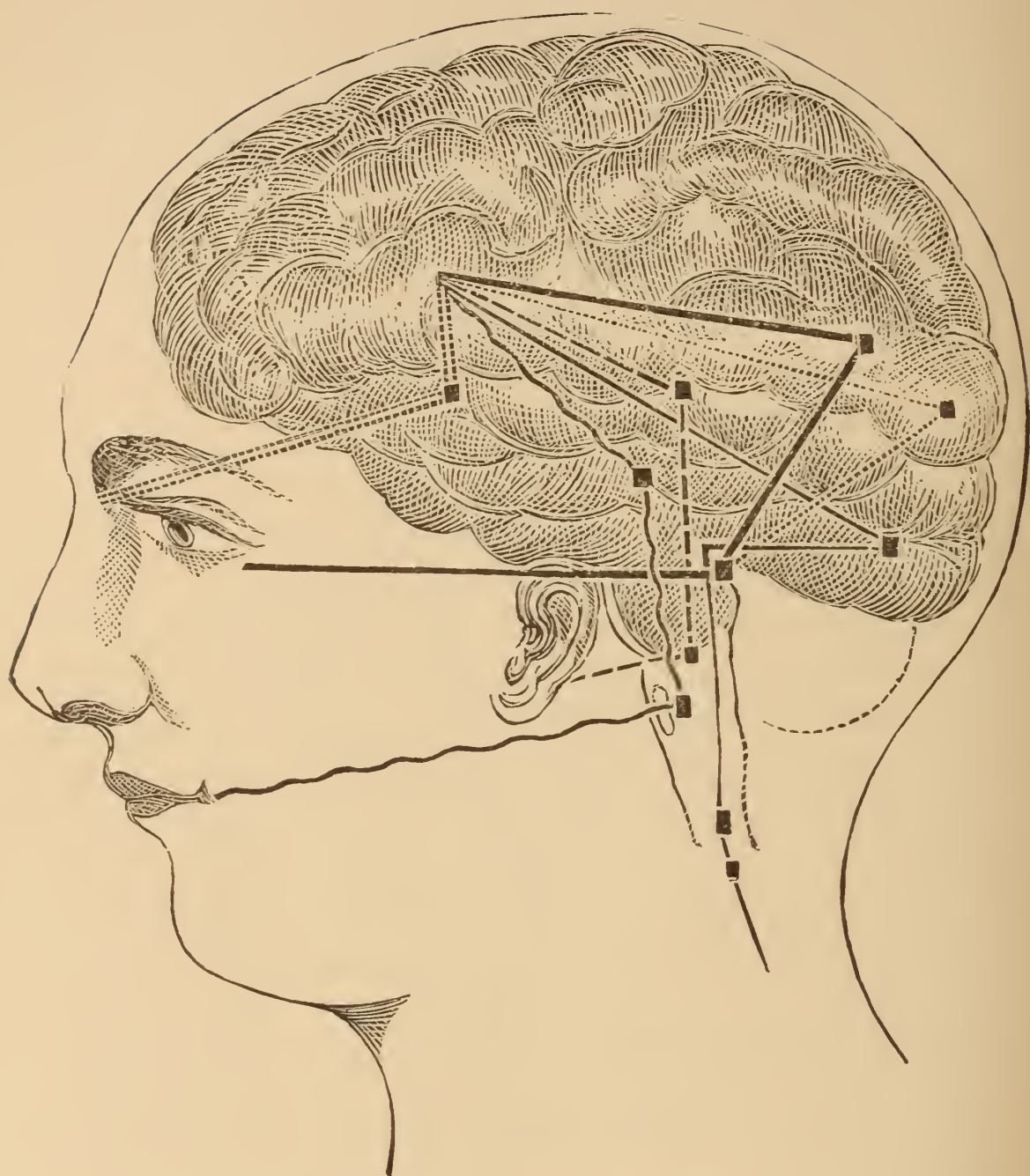
"Several diagrams have been designed to present the mechanism of the formation of words and the aphasic disturbance consecutive to lesions of certain points of this apparatus.

"The first attempt, by Baginsky, was followed by those of Spamer, Wernicke, and Kussmaul. Magnan is the author of the ingenious schema represented in the plate that we borrow from his work. This schema is based on the localization of the different sense centers in the cerebral cortex, for one part, and on the acquisition of all our ideas by the aid of our senses, for the other.

"The centers for the senses are indicated on this schema according to the researches of Ferrier and of Munk.

"Experiments on localization of the sense centers are

*Skwortzoff, *op. cit.*



.....	Sense of Olfaction.
~~~~~	" Taste.
————	" Touch.
- - - - -	" Hearing.
=====	" Vision.



not absolutely in accord. Thus Panizza* places the visual center in mammals in the posterior cerebral convolutions [1855]. Ferrier places it in the angular gyrus for the ape, and in the second external parietal convolution in the dog; with regard to the center of hearing, he places it toward the middle part of the first temporo-sphenoidal convolution in the ape and in the temporal part of the third external convolution in the dog; the center of smell and of taste in the subiculum of the cornu of Ammon and the contiguous parts; finally, the center of tactile sense in the region of the hippocampus.

“According to Munk,† the visual center is situated in the occipital lobe and the auditive center in the temporal lobe.

“According to the researches of Luciani and Tamburini, the visual center is situated in the parieto-occipital convolutions in the ape and dog, the auditory center in the superior temporal convolution in the ape, and in the region corresponding to the third external convolution in the dog.

“While differing with regard to the exact seat of the visual center, these observers find that lesion of a certain part of the posterior half of the brain, the angular gyrus, or a part of the occipital lobe, produces blindness‡ of the opposite side.

“Thus, that which was foreseen by the anatomical and clinical data of Charcot, Vulpian, and Meynert, has been experimentally confirmed by the observers already cited.

“Aside from these experimental researches, clinical researches have been made by Luciani and Tamburini§ and by Nothnagel,|| all of which concur in demonstrating that lesion of these centers causes abolition of the function or the loss of sense images.

“With regard to the acquisition of our ideas, we find that

*“Observations sur le nerf optique,” *Journal de l'Institut*, Lombard.

† “Ueber die Functionen der Grosshirnrinde, Berlin, 1881.

‡ Munk gives the name psychical blindness to disturbances of vision consecutive to a cortical lesion and psychical deafness to indicate disturbances of hearing by a cortical lesion.

§ “Studii clinici sulli centri sensori corticali,” Milan, 1879.

|| “Popische diagnostic der Gehirnkrankheiten,” Berlin, 1879.

in analysis of the formation of these ideas one has to admit that the primitive element, the point of departure, of every idea is an impression received by the sense organs.

"The first ideas of the new-born are reduced to the sensation of that which is agreeable and that which is disagreeable.

"Let us take an example :

"A hot body attracts his attention, he touches it.

"The impression of heat reaches a center where it is transformed into a sensation (disagreeable). From there, by the motor nerves, it is transmitted to the muscles of the arm and the child withdraws the hand. The ideas which appear to us simple are in reality very complex. Every object which presents for our attention reaches several of our senses at once. Let us take an orange, for example: First it attracts vision, the retina receives the impression of its color: this impression becomes sensation in the quadrigeminal tubercles. But it does not stop there, and by the aid of conducting fibers it is transmitted to a second center of higher order where it is transformed into an image, that is 'a sensation which always preserves its aptitude to appear.'* At the same time that we distinguish the color of the orange we perceive its odor. The impression received by the Schneiderian membrane becomes sensation in the olfactory bulb and is transformed subsequently into an image in the subiculum of the cornu of Ammon. Thus, we have the image of the color and of the odor of the orange. But this is not all, it is still necessary to recognize its form, the state of its surface—that we distinguish by touching the orange. The tactile impression becomes sensation in the first center it meets on its way; it subsequently becomes an image in a second center (the region of the hippocampus, according to Ferrier).

"To complete our idea of the orange we have still to taste it.

"The gustatory impression is transmitted from the lingual mucosa to the nucleus in the floor of the fourth ventri-

* Taine, "The Intelligence," vol. ii.

cle, where it becomes sensation. The sensation is transformed into an image in the subiculum of Ammon's cornu.

"These different images together constitute the idea that we form of an orange by the aid of our senses.

"For external reproduction every idea must take form; it is necessary to find a formula, a conventional sign, a name, a word. There exists a point in the brain where the idea assumes this formula; this is the foot of the left third frontal convolution, with the surrounding parts.

"By the aid of the conducting fibers, all the images that the orange has produced in our different sense centers are transmitted toward this region, where the assemblage of these images assumes the name of ORANGE.

"This idea formulated must be projected externally. By the aid of the fibers which go from the third frontal convolution to the medulla—transmission apparatus—the name reaches the medulla, from which the nerve fibers which animate the parts of the phonation apparatus (muscles of the tongue, lips, pharynx, etc.) project it outward.

"In *résumé*, the impression produced on our senses by an external object must traverse three steps before we pronounce the name of the object.

"The first part of this path extends from the periphery to the center for the formation of words—the second part from the third frontal convolution to the medulla—the third, from the medulla outward.

"The different disturbances of speech, as well as disturbance in other modes of manifestation of thought, occur according as one or other of the parts of this tract is attacked.

"If the center for formation of words is injured we have the verbal amnesia of Jaccond. The patient will have the idea of the object, he will indicate its use, will know how to use it, but the *name* of the object will be lost to him.

"If the center for formation of words is intact and if the transmission apparatus is injured, we shall have logoplegia. A logoplegic will have the word and the idea of the object, but he will not know how to adapt the conventional sign,



the name, to the object he wishes to designate. He can indicate the use of the object and even pronounce the name of this object in pointing out another. On the contrary, when the object of this name is presented to him, he will not be able to find this name.

“If the passage for transmission between the visual center and the center of formation of words is attacked, the patient will have the visual image of all objects, as well as letters; he will have the name of letters, but will not be able to give the right name to the letter that he sees and there will be blindness for words. Partial and slight alterations of the visual center may produce the same trouble. If the destruction of this center is complete, the patient will no longer see, there will be cortical blindness, which does not enter into our subject, but which comprises blindness for words.

“If the lesion be in the conducting fibers, which connect the auditory center to the center of the formation of words, the patient will hear the sound produced by the pronunciation of words; he will have the idea of these words, for he comprehends written words, but he will be unable to refer the word to the sound that this word designates and there will be deafness for words. Similar troubles are met in cases of partial lesion of the auditory center; complete deafness will occur in cases of total destruction of this center.

“We must add that in the cases we have collected of word-deafness with autopsy, the auditory center (superior spheeno-temporal convolution) was affected; also, that in the cases of word-blindness with autopsy, the angular gyrus was always attacked.

“Education gives origin to secondary associations between the different centers for the senses, and it is because of these new organic connections that a single image of an object may awaken another image of the same object, and even the entire idea, that is to say all the images of an object that are impressed at one time on our brain.

“Let us take an example; suppose we smell the orange

without seeing it or touching it. This image, that we owe to the sense of smell, awakens the images that we owe to our other senses, and these images will be transmitted to the center for formation of words, where as a whole they bring to memory *the word orange*. This word will be transmitted to the medulla and from there projected outward by the nerves of the apparatus of phonation.

“This explains why an aphasic who is afflicted by word-blindness has been able to recognize letters by the aid of the sense of touch. It was the visual image of the letter which called up the name in the brain of the patient before he was attacked by word-blindness, while later, when the apparatus of transmission, between the center where the visual image is formed and the center where arises the name of the letter which arouses this image, was wounded in such a way that the patient could no longer apply the name to the image, because of the interruption of the connection between these two centers, then the tactile image replaces the visual image in awakening the name of the letter.”

*(To be concluded.)*

## OPHTHALMOLOGICAL NOTES.

—In the somewhat rare disease known as *syringo-myelitis* Déjerine and Tuiland have been able to collect data, relating to ocular symptoms, in seven cases observed at the Bicêtre, in Paris (*Soc. de Biol*, July 12, 1890). From their observation it is concluded, in the absence of any material alteration of the fundus oculi, that a very marked contraction of the visual field may exist. This loss in the peripheral visual field is very marked, even as much as in hysteria. The contraction of the visual field is manifested for all the colors, as well as for white, though the loss of the field for the latter is less pronounced than that for colors. This remarkable symptom is worth remembrance, for we know that it is also common to hysteria and to traumatic neurosis.

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—As in the preceding disease, the association of ocular symptoms with *acromegaly* has only lately been described in a thorough manner, although Sancerotte, in 1772, mentions a patient affected by exophthalmos due to thickening of the bones of the orbit. Of this disease, when accompanied by well-marked ocular symptoms, three new cases have lately been reported. The first is that presented by Rognami to the Société Lancisane des Hôpitaux de Rome (*Ann. d'oc*, t. cvi, p. 46). In this case was found a very advanced stage of simple atrophy of both optic discs. It is well to note this fact as the diminution of vision in acromegaly has usually been attributed to pressure on the chiasm by the increase in size of the hypophysis cerebri, and this seems a corroboration of such a view. Here could also be sought the cause of the paralysis of one of the abductors and the general limitation of the movements of the eyes. The second report, by Debierre, presented to the Société d'ophtalmologie de Paris (*Recueil d'oph.*, 1891, p. 111) concerns a case of acromegaly with symptoms of tabes dorsalis and with bilateral temporal hemianopsia. Here vision in the right eye



was reduced to perception of movements of the hand at one metre and in the left eye to .1 of normal acuity. The visual field, taken with a perimeter, presented a very clearly marked temporal hemianopsia of both sides. In the right eye the sense of colors was so diminished that none of the colors were normally perceived; in the left eye red and blue were perceived in a field corresponding to that of white. In the right eye there existed traces of an old paralysis of the third pair, characterized by a slight ptosis of the upper lid, a slightly marked divergent strabismus and a difficulty in turning the eye inward. The ophthalmoscope demonstrated a white atrophy of the optic papilla of both sides. With the exaggerated development of the face and of the extremities, weakness, palpitation, absolute suppression of the menses, as described by P. Marie in 1885, there also existed in this patient many tabetic symptoms. The temporal hemianopsia noted by this author, was also reported in one other case by Schultze. The third case, of which I speak, is one of very late date, presented to the Société française d'ophtalmologie (*Arch. d'ophtalmologie*, t. xi, p. 309,) by Dr. L. Pinel, Maisonneuve. In brief, this case had exophthalmos, paresis of the movements of the bulbus and of the iris and amblyopia due to papillary stasis.

The clue to these ocular lesions, in acromegaly, is to be found in the hypertrophy of the pituitary body, as already spoken of. Thus, we know that this structure (the hypophysis cerebri) is contained in the sella turcica, limited in front by the chiasm and the optic nerves, behind by the cerebral peduncles. Its increase in volume would therefore mean direct pressure on the chiasm. Among the numerous autopsies undertaken in acromegaly, we find that an exaggerated growth of the pituitary body is a constant pathological lesion. In one case it had the size of a hen's egg. In a case related by Henrot, the chiasm was completely flattened. In an autopsy by Fritsch and Klebs, the optic nerves were compressed laterally. This increase in the size of the pituitary body may, then, lead to consecutive atrophy of the optic discs, when the whole of the chiasm is subjected to pressure, or may be manifested by temporal hemianopsia (as in the cases by Schultze and Debierre), when a limited portion of the chiasm is subjected to greater pressure than the remainder of its structure.

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—*Sclérose en plaques, insular sclerosis* or *disseminated sclerosis* has received considerable attention from Charcot and from

Parinaud, but, during the past year, Uhthoff has again revived the subject by dividing into two parts the ocular symptoms associated with this disease. In the first, he gives the pathology of the optic atrophy occurring in insular sclerosis. The nerve lesion consists essentially in a proliferation of interstitial connective tissue which strangles the nerve fibers and causes their gradual atrophy. This atrophy may occur so slowly that the ophthalmoscopic image may long remain normal, although the nerve trunk behind the bulbus be the seat of the most advanced lesions.

Clinically, the dominant feature is the very general (if not absolute) presence of a central scotoma. The central scotoma may be complicated by narrowing of the visual field, or, again, as observed in one case, the narrowing of the visual field may be the definite feature.

The visual disturbance may appear suddenly or slowly. In case blindness ensues, it is usually of very rapid progress. The important fact to remember is that the visual disturbance is usually the first symptom of the disease and that it assumes the form of the amblyopia of a retrobulbar neuritis. Likewise, the ophthalmoscopic examination shows the same appearances as in retrobulbar neuritis. These characters permit easy differentiation of the optic neuritis of insular sclerosis from that of tabes and also from hysterical amblyopia.

The muscular disturbances in insular sclerosis are given as of two varieties, paralyses and nystagmus.

Paralyses of the ocular muscles are noted in seventeen per cent. of the cases. They are very probably of nuclear origin. This paralysis affects the external muscle twice as often as the third pair of nerves. These paralyses often constitute the initial symptom of the disease.

Nystagmus is much more frequent in insular sclerosis than in tabes dorsalis.

Changes in the size and in the reaction of the pupil are not the rule in insular sclerosis and the phenomenon of myosis is especially less frequent than in tabes. This symptom was only observed once. In three cases Uhthoff found a difference in the size of the two pupils.

*  
* *

—Among other nervous lesions, in which the associated ocular symptoms have been deeply studied, *tabes dorsalis* has received a

great amount of attention, but this subject has been so thoroughly analyzed and sifted out by E. Berger (in Knapp's *Archives*, 1889, and in the *Recueil d'ophtalmologie*, 1890) that we will pass, in conclusion, to a rare neurosis, Gerlier's disease (called by the French, *vertige paralysant*), characterized by vertigo and paralysis, endemic in the Canton of Geneva, Switzerland. Gerlier was the first to speak of this neurosis, as consisting of the following symptoms: Paresis (flexion of the head on the chest), ocular disturbances (ptosis), the most constant signs of an attack of vertigo, and cervical pain. The pathogeny of the ptosis in this disease has not yet been demonstrated, indeed the only reference I have been able to find, on this new neurosis is given by Ladame (*Rev. Méd. de la Suisse romande*, June 20, 1891). The fact that this neurosis occurs in the working class and not among those of neuropathic predisposition, militates against the supposition that the ptosis may be hysterical in character.

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—Manz has been able to examine a pathological specimen of embolism of the central artery of the retina occurring in connection with heart disease. The patient's death took place one year after becoming suddenly and completely blind. The pathological examination showed in the central artery of the retina a round clot of firm consistence, adherent to the arterial walls. Behind the clot there existed a fibrinous thrombus. The optic nerve was atrophic to a high degree, and the papilla was the seat of a manifest excavation. The atrophic process also affected the retina and the choroid. In the choroid some hemorrhagic spots were also present.

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—Snell presents a case of nystagmus in a compositor, twenty-two years of age. The disease appeared suddenly after several months' work, from 7 A. M. to 3 P. M. One day, on walking, the subject remarked that objects moved vertically, while at the same time he felt dizziness without headache or nausea. Careful examination revealed no lesion, peripheral or central. A very marked resemblance to miner's nystagmus drew attention to the manner in which the patient worked. Snell noted that he raised his eyes alone to the copy, in place of turning the head and the eyes together, like his fellow-workmen. Here appeared the origin of the disease. The nystagmus gradually improved, and the patient



was able to resume work two months and one-half later. He now works without difficulty by following the counsel to raise the head in looking toward the copy.

* *

—A case of retrobulbar neuritis reported by Liebrecht, as resulting from the internal administration of arsenious acid, is of great interest. A man of thirty years, who had taken pills of an arsenical base during three years and one-half, presented a considerable diminution of the vision in both eyes, as well as paracentral scotomata for red and for green. In the right eye existed a small absolute scotoma at the side of the point of fixation. The temporal half of each papilla was pale. In default of any other ætiological factor, Liebrecht considers these disturbances as due to the chronic toxic effect of the arsenious acid.

* *

—Fischer relates the cure of an embolism of the central artery of the retina, by means of frictions over the eyeball (*Deutsche med. Wochenschrift*). The case relates to a woman, of thirty-eight years, who presented herself two hours after being attacked by sudden blindness of the right eye. The retina had a grayish tint, especially marked in the region of the macula, with a red point in the fovea. The vessels were fine, with few ramifications. In two of the veins the blood column was interrupted at several points. By pressing on the eye, Fischer found displacement of these small red cylinders. This determined him to soft frictions over the diseased eye-ball, in the hope of displacing the embolus which obstructed the central artery. During the course of his maneuvers, the fundus was examined with the ophthalmoscope, from time to time, to note the change in the appearance of the retinal vessels. All at once the patient cried that she could again see with the lower part of the eye. After continuing the massage with two fingers, and progressive relief of the plugged vessels, there only existed, at the end of the sitting, a central scotoma of slight extent. This subsequently diminished, and vision was re-established, with persistence of a relatively very small annular scotoma.

* *

—A few similar cases of cure of embolism of the central artery of the retina are on record. Thus, W. White has published the observation of a man, thirty-one years of age, attacked by blind-

ness of the right eye, in consequence of embolism of the central artery of the retina, in whom he found, some hours later, after pressure on the bulbus, that the retinal vessels were refilled with blood. At the end of two days vision was restored.

In a case by Mules, in another by Hirschberg, and in a third by Hilbert, the disturbances consecutive to an embolism of one of the branches of the central artery of the retina were rapidly removed by massage over the bulbus. It is but fair to remark, however, that in only one of these three reports was there a direct ophthalmoscopic demonstration of a restoration of the circulation in the retinal vessels.

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—Since Wernicke first described the symptom which he designated as hemiopic rigidity *of the pupil* there have been very few verifications of its presence in connection with hemianopsia. Before Wernicke, however, Gräfe had found that in cases of total blindness pupillary reaction sometimes existed, and was sometimes absent, according to the seat of the lesion causing blindness. In cases of hemianopsia, the pupillary reaction may likewise exist or be wanting, but here it must be noted that observation of this phenomenon is very difficult. Wernicke explains these variations by an incomplete decussation of the optic nerves.

What is the relation of the pupillary reaction in Wernicke's theory? The center for the movements of the pupil is in the region of the quadrigeminal tubercles, and the fibers of the fifth nerve, arising in this region, preside over the pupillary reactions. These fibers unite in such a manner that a single pupil never reacts alone. With a cerebral lesion situated in the optic tract in front of the quadrigeminal tubercles, there results an interruption to the reflex arc of the pupil for the anæsthetic half of the retina, but this arc remains unaffected, so far as concerns the sensitive half of the retina. By exciting this half, we immediately obtain a pupillary reaction.

On the contrary, when the lesion is situated behind the quadrigeminal tubercles, the reflex arc of the pupil is entirely interrupted, and the pupillary reflex is completely abolished.

It remains to be seen if clinical observations correspond to these theoretical deductions; For this part, very delicate experiments are necessary, for it is very difficult to concentrate the rays of light exactly, sometimes on the anæsthetic half, sometimes on

the sensitive half of the retina. In the first case especially it is also possible that in projecting light rays on the sensitive half of the retina, excitation of the sensitive portion may occur from an involuntary reflection, and false results may present.

Wernicke's theory has so far been verified by very rare observations. Martins has published a case of hemianopsia with hemiopic pupillary reaction. Other symptoms, in this patient, coincided with the hypothesis of a cerebral lesion located as in the theory given above, but the patient grew better and left the hospital, so that there was no verification by autopsy.

However, Leyden has lately published (*Semaine Medicale Recueil d'ophtalmologie*, September, 1891) a case with autopsy which verifies Wernicke's theory. Briefly stated, this was a woman, of sixty-nine years, who entered Leyden's clinic on April 27, and died May 11, 1891. In 1890, she had an attack of right hemiplegia, consecutive to apoplexy. April 23, 1891, four days before entering the hospital, she had a second attack of apoplexy, followed by paralysis of all the left side. There was then paralysis of four limbs, and of the face. One day ptosis of the left eyelid was also found. Then there was noted a pronounced homonymous hemianopsia of the left side, corresponding to the right half of the retina. A light was reflected from the ophthalmoscope on the right half of the retina without obtaining a pupillary reaction, but in displacing the reflected image from the right toward the left half of the retina a reflex was produced. From this symptom it was concluded that the causal lesion was in front of the quadrigeminal tubercles. This conclusion was also based on a series of other considerations. It is known that apoplectic foci are situated, in the majority of cases, in the lenticular nucleus, in the optic layer, in the striated body, and in the semicircular center of Vieussens, that is in front of the quadrigeminal bodies. Besides this, there were the concomitant symptoms of a strong deviation the eyes to the right and of the ptosis of the left upper eyelid.

The autopsy was a complete verification of this diagnosis, as well as of Wernicke's theory. The apoplectic focus was situated to the right and in front of the quadrigeminal tubercles.





## BOOK REVIEWS.

ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES. A Yearly Report of the Progress of the General Sanitary Sciences throughout the World. Edited by CHARLES E. SAJOUS, M. D., and seventy Associate Editors, assisted by over two hundred Corresponding Editors, Collaborators, and Correspondents. Five volumes illustrated with chromo-lithographs, engravings, and maps. F. A. Davis Co. Philadelphia, New York, Chicago, and London. 1892.

The current edition of this valuable contribution to medical literature is before us, and it is sufficient to say that the usual high standard of this publication is fully maintained. In all the departments of medicine the reader is confronted by the results of the latest researches made by the scholars and investigators of all nations. The facts obtained are stated in most concise language, while a complete table of reference enables the reader to trace to its original source any one of the statements made in the work.

The one hundred and fifty-two pages devoted to Ophthalmology seem to us to be more than usually interesting. Otology receives consideration to the extent of forty-six pages, while thirty-two pages are devoted to Diseases of the Anterior and Accessory Nasal Cavities, eighteen pages to the Diseases of the Pharynx, Naso-Pharynx, Tonsils, and Soft Palate, thirty-eight pages to Diseases of the Larynx, Trachea, and Esophagus, ten pages to Intubation of the Larynx, and fourteen pages to Diseases of the Thyroid Gland.

The busy specialist should find this work invaluable, as it presents absolutely everything worthy of note, and in it the most omnivorous reader must find some things which he would otherwise miss. The text is interspersed with many lithographs and cuts which are excellent. The publishers' work throughout is well done.

DISEASES OF THE THROAT, NOSE, AND EAR. A Clinical Manual for Students and Practitioners. By P. McBRIDE, M. D., F. R. C. P., Ed. Philadelphia : P. Blakiston, Son & Co., 1012 Walnut Street, 1892 ; pp. 640.

This work inaugurates one feature, the absence of all drawings of instruments. This is done, we are told in the preface, "because it has always appeared to me that they are unnecessary for the very simple reason that the practitioner must possess the means of operating before he proceeds to operate." To this there are many decided drawbacks, making the work, in this respect, more useful to the specialist than to the "senior student and general practitioner," for whom it is chiefly intended.

The Anatomy and Physiology have been omitted, assuming that this, again, would seem to detract from the value of the work to the non-specialist.

One very important feature is the admirable manner in which the thirty-eight colored plates have been executed from the author's original drawings. These are appropriately placed directly with the text and not on extra pages.

The opening paragraphs are disappointing in that they seem to contain too little of the subject treated, but as one reads further it is impossible to ignore the fact that the book is written in a most pleasing manner, and one scarcely turns a page without encountering some original, practical suggestion, thus making it one of the most valuable reference manuals and text-books pertaining to the throat, nose, and ear.

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#### NOTE.

Dr. Charles Deady has removed to No. 110 West Forty-eighth Street.

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